Rural income generating activities: a case study of nine villages in the northeast China

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RURAL INCOME GENERATING ACTIVITIES: A CASE STUDY OF NINE VILLAGES IN THE NORTHEAST CHINA

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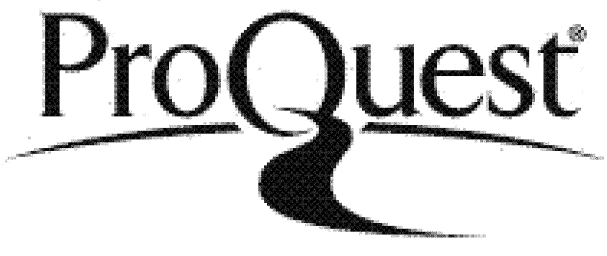

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ABSTRACT

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Rural Income Generating Activities: A Case Study of Nine Villages in the Northeast China

This thesis provides an econometric analysis of three aspects of Chinese rural income generating activities using data from a survey of 450 rural households conducted by the author in 1998.

The first topic is the allocation of and remuneration to off-farm activities (OFAs) in rural China. A multinomial logit model is deployed to track the determinants of allocation of OFAs; Mincerian earnings functions and Translog production functions both with corrections for selectivity are used to analyse remuneration to different OFAs. The findings are that although social factors continue to operate in the countryside, market rather than political forces are playing an increasing role in determining the allocation of and remuneration to private off-farm employment opportunities.

The second topic is an enquiry into what determines rural households' choice of income generating activities and what they gain in term of household income, employment and returns to labour from active diversification of income generation activities. Two explanatory variables are constructed as surrogates for income source diversification in a series of household production functions. The results are that peasants who diversified into riskier activities than grain farming were able to raise family incomes and employment, and also enjoyed increasing returns to their labour time.

The final topic models Chinese rural labour participation and labour supply behaviour adopting Jacoby's (1993) approach. The findings include that probability of female labour participation increases with shadow wage, family property income and number of children aged seven to eighteen but decreases with their husbands' shadow wage; female labour supply is much more sensitive to own wage changes than is male labour supply, but male labour supply is much more sensitive to compensated cross wage effects than female labour supply.

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Abbreviation

OFAs	Off-Farm Activities
OAEs	Own-Account Enterprises
AHs	Agricultural Households only engaged in farming
DHs	Diversified Households between farming and non-farm activities
NAHs	Non-Agricultural Households specialised in OAE

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Chapter 1

INTRODUCTION

Chinese rural income generating activities have been experiencing radical changes brought about by the economic reform since the late 1970s. Before the economic reform, Chinese peasants were tightly bound to the land of their native village by the collectivised agriculture and the constraining household registration system (*hukou*). The abolition of collective agriculture and the relaxation – but by no means the abolition - of the *hukou* system, has permitted rural households and individuals to take their own decisions about choice of livelihood. Although subsistence farming, with its peasant mode of life, continues to dominate the countryside, a whole array of off-farm activities (OFAs) has emerged. These offer the prospect of diversification of income sources and of enhanced earning potential.

This thesis is to examine rural income generating activities using data from a 450 rural household survey conducted by the author in a cluster of nine villages in Xinmin county in the northeast province of Liaoning of China in the year of 1998. The research questions are:

(1) What are the determinants of and remuneration to off-farm activities (OFAs) in rural China?

(2) What determine rural households' choice of income generating activities? What did rural households gain from active diversification into a broad variety of income generation activities compared to conventional grain farming?

(3) What are the determinants of Chinese rural male and female labour participation and labour supply behaviour?

The rest of this introduction chapter is organised as follows. The historical, social, economic and political institutional arrangements related to rural development before and after the economic reform will be reviewed in detail in Sections 1.1 and 1.2 respectively. The issues of rural income generating activities and the related theories are discussed in Section 1.3. The detailed description of the fieldwork is in Section 1.4. Finally, Section 1.5 will review previous studies and lay out organisation of the thesis.

1.1 The economic and social institutional arrangements related to rural development in the pre-reform period, 1950s – 1970s

All developing countries are confronted with choosing development strategies, which ought to be appropriate for their specific social and economic background and conditions. In turn, different development strategies require different social and economic institutional arrangements to implement them.

When the new China was founded in 1949, the economy had seriously been damaged by nearly half-a-century-long continuous wars. At that time China was generally an agricultural country characterised by land scarcity, surplus labour and poverty; 88

percent of her 450 million population inhabited rural areas (State Statistic Bureau, 1997: 69) and relied mainly on subsistence household farming; in term of industrialization, modern mechanized industry accounted for 10 percent of the country's *GNP*, the rest was the handicraft or non-mechanized industry (Sun, 1992: 25). As a result of such a backward economy, all consumer and capital goods especially food were in extreme shortage. Internationally, the Chinese government was isolated. Few foreign governments recognised it. Therefore, not only was it impossible for her to get any foreign investments, loans or aids except from the USSR to which China was then tied, but also the western developed countries imposed economic sanctions on China.

Although encountering such a poorly developed economy, the then leaders of China earnestly desired to make the country strong in order to realize their ardent ideals of revolution. They thus faced the problem of choosing a development strategy and the appropriate administrative institutions to organize the economic reconstruction in order to achieve their purpose relatively fast. After weighing the external and internal political and economic environment, and not least the political leaders' economic intuition, the heavy industry-oriented development strategy was selected.

Not only are heavy industries extremely capital intensive, but also their construction involves a long gestation period and ideally needs a large amount of imported equipment and technology from the developed countries that then was out of the question. The conflicts between the characteristics of heavy industries and of Chinese economy made it impossible to implement the heavy industry development strategy by means of a market mechanism. The solution was to make institutional arrangements to lower the barriers to the development of heavy industries, namely, to suppress the interest rate, foreign exchange rate, prices of energy, raw materials, agricultural products and wages, so as to artificially reduce the cost of heavy industry development by providing cheap labour,

capital, raw material, and imported equipment and technology for heavy industry products (Lin, Cai & Li, 1996: 20).

About the time that industry and commerce were nationalized,[1] agriculture was collectivized; the household registration system (*hukou*) and the state monopoly system of procurement and marketing of agricultural products were created. Consequently, a centralized, planned resource-allocation mechanism and a puppet-like micro-management system were formed (Lin, Cai & Li, 1996:20). There were not much room left for market to function. The rest of the section explores the detailed social and economic institutional arrangements required by the heavy-industry oriented development strategy and related to rural development.

State monopoly of procurement and marketing of key industrial and agricultural products. Due to the extreme shortage of all consumer and capital goods, and the fact that importing from western countries was not possible in the 1950s, the choices remaining for the implementation of the heavy industry strategy were severely constrained. To keep the cost of developing heavy industries down, cheaper agricultural products and other raw materials were needed. However, the low price policy for agricultural products suppressed peasants' incentives to sell their products to the state. Therefore, to guarantee that the factors and products whose prices were suppressed and still were transferred to the priority sectors, and to ensure that any economic surplus would be used to accelerate the development of heavy industries, the Chinese government turned

[1] The industrial sector inherited by the new China in 1950s was very poorly developed and in private hands. Of them, 'bureaucrat capitalist' firms owned by the capitalists with strong bureaucrat background under the defeated Nationalist Party government accounted for two-thirds of all industrial capital and four-fifths of the fixed assets of industry, transport and communication (Editorial Committee of China Handbook Series: Economy, 1984). Through the socialist transformation, 'bureaucrat capitalist' firms were confiscated and transferred to state-owned enterprises (SOEs) during the period of 1949-1956. Meanwhile, small business and the individual handicraft industry were also transformed to either SOEs or urban collective enterprises. These became the base of the Chinese industrialisation.

to a centralized planning mechanism for carrying out and managing resource allocation. In 1953, a state monopoly system of procurement and marketing of major agricultural products was set up. To comply with this, a rationing system gradually came into being to control demand in urban areas with coupons issued for grain, cooking oil, clothes, etc. Under this state monopoly system, prices of agricultural products and all other raw materials needed by industrial sector were artificially kept low, whereas those of industrial products were set high. This is the so-called 'price-scissors' policy. Through this state price control system, industrial workers' living costs and hence their wages were maintained relatively low in order to reduce cost of industrialisation. In other words, by using price control, the Chinese government kept transferring part of cost of urban industrialisation to peasants; or, peasants' interests were sacrificed by this development strategy.

Through the state system of monopoly procurement and marketing of agricultural products and the centralised planning mechanism of resource allocation, on average 15.5 billion *Chinese yuans* of peasants' income was transferred each year to urban industrialisation and urban residents in the period 1950-1978 continuously and invisibly (Zhang, 2002). This amount of annual transfer accounted for 44 percent of the country's gross output value of industrial products in 1952 and 17 percent in 1962 (Table 1.1).

Agricultural collectivization. As low price compulsory procurement reduced peasants' incentive to produce, it was imperative that the state create an institutional arrangement that would ensure its control of agricultural production. Following this logic, the state started pushing forward the agricultural collectivization movement (Lin, Cai & Li, 1996:42). In the period of 1953 to 1956, the Chinese government launched the movement of collectivization in the countryside after the completion of the nationwide land reform

programme[2] in 1952. The agricultural collectivization was implemented in stages, namely, 'mutual aid teams', 'elementary agricultural producers' co-operatives' and 'advanced agricultural producers' co-operatives'. Until 1958, under the People's Commune movement, all co-operatives were communised. In the process of collectivisation, all the land, livestock, farm implements and other means of production were brought into production brigades and communes.

The People's Commune consisted of three levels in terms of ownership as well as economic and administrative management: commune, production brigade and production team. The production team was the basic economic unit. Production team members worked collectively on collective-owned land organised by production team. The principle of income distribution was egalitarian within each of production teams, which resulted in the work incentive of team members diminishing steadily. Food and other agricultural products were rationed to ensure that the majority of agricultural products were sold to the state. Needless to say, collective agriculture was inefficient.

Craftsmen and small handicraft producers were organised along the similar lines into 'supply and marketing small groups' and ultimately into 'producers' co-operatives' and relocated in towns, and administered separately from agriculture by county governments (Byrd & Lin, 1990:9; Sun, 1992:149-164; Ho, 1994:14; and Lin, Cai & Li, 1996: 48). These non-farm 'enterprises' were mainly engaged in farm tool-making and repair plants, farm product-processing shops and the likes.

Migration control and setting up *hukou* system. Also because heavy industries were capital-intensive, their ability to absorb labour was very limited. Thus China could

[2] The Chinese government confiscated all the land from landlords and rich peasants and then freely and evenly redistributed it to all peasants who had no land or had less land than average. This programme was completed in 1952.

not realise a very large transfer of rural labour to urban sector. Besides, the supply of food and social facilities in cities was limited. Partly because of this, China established the household registration system, i.e. *hukou*. In the early 1950s, the Chinese government introduced the *hukou* whereby every household was classified either as an 'urban *hukou*' or a 'rural *hukou*'. Members with urban *hukou* were entitled to subsidised grain rations, subsidised housing and other amenities (e.g., job assignments by the labour bureau, permanent employment, and health insurance). Those with rural *hukou* could not get access to any of these benefits. In response to the rising costs of the entitlements given to those with urban *hukou*, the government in 1959 made it extremely difficult to change one's *hukou* from rural to urban. Besides, rural residents were also not allowed to move to other relatively prosperous rural areas. All 'peasants' belonged to rural *hukou* (Ho, 1995: 382).

To enforce the *hukou* system, i.e. rural-urban segregation and stopping peasants moving to cities, the Chinese government implemented three supplementary measures. One was the urban 'staple food ration system' under which food coupons were issued to the residents with urban *hukou*. Most of the coupons were distributed locally and were only valid locally. Besides, the quota of coupons to each urban resident was rarely sufficient. Without food coupons, rural people could hardly survive in cities for long. Even eating in restaurants, food coupons were required. The second one was the discipline of the People's Commune. Peasants were required by the People's Commune to work collectively everyday (there wasn't a concept of weekend). Any absence might be punished. Besides, if any rural residents wanted to go to cities even for a short period, s/he had to apply for an official document from his/her commune. Otherwise, s/he was not allowed to buy a train ticket or live in any hotel in cities. The third one was to set up a special police force in cities that spot out and deport those who did not have urban *hukou* and did not hold any official documents permitting a temporary urban stay.

Through the *hukou* system and the three supplementary enforcement measures, peasants were firmly tied to the land and hence rural-urban segregation was guaranteed. Furthermore, as emphasised by Solinger (1999: 36) said, the *hukou* 'became an ascribed, inherited one, determining an individual's entire livelihood and welfare simply on the basis of where the registration was located.'

Human development institutional arrangements. While not allowing peasants to move to urban areas, the Chinese government also established and maintained totally different, divided and urban-biased human development institutional arrangements (referred to HDIAs hereafter) between rural and urban. The much better HDIAs enjoyed by urban residents were guaranteed by the state budget, whereas the much weaker and worse HDIAs available to rural residents had to be financed by the much poorer People's Communes and Brigades, i.e. by rural residents themselves. Note that, through the state monopolised system of procurement and marketing of agricultural products and the 'price scissors' mechanism, a large part of peasants' income had been siphoned invisibly to the central state budget to finance heavy industries.

In detail, urban residents particularly those state employees were entitled to a list of HDIAs. They were life-long job security, free medical care in proper hospitals, free education for children in proper schools, retirement pensions, paid sick leave and maternity leave, housing benefits (decent houses or apartments with heating, electricity, water subsidies), subsidies for food, inner city transport, hairdressing and bathing, newspaper and books, even children's employment. Nearly all these HDIAs were arranged through working units. Needless to say, they were absolutely inaccessible to peasants.

In contrast with the relatively luxury and state-guaranteed HDIAs appropriated to urban residents, what peasants got were really much worse, unstable and very little. These

'very little' HDIAs financed by the People's Commune and Brigade or rural residents themselves were commune-run health centres and the famous 'barefoot doctor' system, free education for children and basic living support for the disabled and orphans and old peoples without offspring. The health centres run by the People's Commune did not have qualified doctors, nurses and medical equipments; therefore they were not proper hospitals. The 'barefoot doctors' were not properly trained so that they could not deal with any serious medical needs. Although there was free education for children, few of school teachers were qualified, while school buildings and equipments were much worse than urban ones. Except for these, there weren't any other HDIAs. There were no pensions (peasants' pensions were their offspring), nor any housing benefits (rural residents had to build houses by themselves), nor any financial subsidies, even no tap water.

In short, compared to urban residents, rural dwellers lived in an environment with very poor human development arrangements.

In summary, the heavy industry oriented development strategy chosen by the Chinese government in 1950s led to establishing a series of institutional arrangements: a state-owned industrial sector, collectivised agriculture, the *hukou* system, the state monopoly system of procurement and marketing of agricultural products, the 'price scissors' mechanism, the centralised planning mechanism for carrying out and managing resource allocation and the urban-biased HDIAs. Through the *hukou* system and the collectivised agriculture in the form of the People's Communes and Brigades, peasants were tightly bound to the land of their native village. Consequently, a dualistic pattern of urban-rural stratification was formed (Solinger, 1999: 27). Through the 'prices scissors' mechanism between agricultural and industrial products, and the system of state monopolised procurement and marketing of agricultural products, a large part of peasants'

income were continuously and invisibly transferred to urban industrialisation and urban residents. Through the divided urban-biased HDIAs, rural peoples were kept in very poor human development environment. In brief, the heavy industry oriented development strategy and the process of implementation of it resulted in rural-urban segmentation, the sacrifice of peasants' interest and discrimination against them in the period from the 1950s to the 1970s.

Interactions between rural and urban were: cheap agricultural products went to cities; expensive industrial products[3] came down to countryside; every year a large amount of money was transferred to the central state budget to finance urban industrialisation and urban residents. As far as rural-urban migration was concerned, it was so limited that only university graduates and retired military officers up to certain rank were given urban *hukou* and assigned state jobs. Even a rural woman who married a city man was not given an urban *hukou*.[4]

The negative economic consequences brought by the heavy industry development strategy and the process of implementation of it to rural residents were serious. For examples, the income gap between urban and rural was substantial: during the period of 1956-1978, the estimated urban-rural ratio of per capita was between 3.30-2.30 (Table 1.2) without considering the huge gap of quality of life between urban and rural; in the end of the period of 1952-1978, more than one-third of rural households were in debt and about 100 million rural populations suffered from food shortage (Zhu, 1991).

Before the Chinese Communist Party took power, people were told that one of the Communist Party's ideals was to remove gaps between urban and rural and between urban residents and rural peasants. Ironically, once the Communist Party got power, the two gaps

[3] A domestic-manufactured hand watch would cost a rural adult male worker's whole year earnings from a production brigade in 1970s.
[4] City women would never want to marry rural men because they are peasants and hence the underclass folks.

were not removed at all but deepened and widened to their extremes. The severest social and economic inequality in China (even up to the twenty first century) is between the rural and the urban.

1.2 Economic reform and rural non-farm activities since the late 1970's onwards

While Chinese peasants were fastened tightly to the land and firmly confined to their native villages by collectivised agriculture and the *hukou* system, urban residents, although they enjoyed a series of social benefits inaccessible to peasants, were also tied to their working units either state-owned or collective-owned. Consequently, there wasn't any labour mobility from rural to urban even between different cities or different production teams. Additionally, the majority of consumer products were rationed and nearly all capital goods were centrally allocated. The collective agriculture led to inefficient farming, poverty of rural residents and countrywide food shortage (Zhu, 1991). The state-owned industrial sector caused diminished work incentives for employees, low efficiency, great shortages of needed industrial and consumer products on the one hand, and stockpiles of unwanted ones on the other. By the 1970s, the centralised planned economy had reached a stage of collapse.

Embroiled in such a severe economic crisis, in the late 1970s Chinese Communist government headed by Deng Xiaoping, decided to begin economic reform and to open the door to the world. At the early stage of economic reform, nobody knew how to carry it out, where to start, etc. This was why Deng Xiaoping said that economic reform is like

crossing a river by groping for stones.[5] Hence, they were very cautious and hence adopted a step-by-step strategy. Chinese economic reform has been greatly deepened during last two decades, accelerated by the recent China re-joining WTO, but is still far from complete. In the hindsight the Chinese style of economic reform is to gradually abolish or abandon centralised planned institutional arrangements designed for the heavy industry development strategy in order to let market function and to leave individuals alone to pursue their economic interests. In the rest of this section we investigate how the old institutional arrangements were abolished gradually.

Abolition of collectivised agriculture. Facing a serious nationwide food shortage and the poverty of peasants, the Chinese government started economic reform by abolishing collectivised agriculture. The milestone of Chinese economic reform was the Third Plenary Session of the 11th Central Committee of Chinese Communist Party (CCP) held in December 1978. During this meeting, three decisions were made on rural development: (1) to encourage 'the simultaneous development of farming, forestry, animal husbandry, sideline occupations, and fishery'; (2) to allow the individual economy greater flexibility to develop in rural areas; and (3) to promote the vigorous and systematic development of commune and brigade enterprises (CBEs[6]) (Ho, 1994: 21).

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[5] Deng Xiaoping's theory has been written into the constitution of the Chinese Communist Party. The theory is comprehensive and practical. It was summarised as the famous '3 M theory'. The first 'M' proposed by Mr Deng in the 1950s was that no matter white or black, a cat is a good cat if it can catch mice. Cats in the Chinese are called 'Mao'. This is why the first M is also dubbed as 'Mao (cat) theory'. The second 'M' is just 'economic reform is like crossing a river by groping stones.' 'Groping' translated into Chinese is 'Mo'. This formed 'Mo (groping stone) theory'. The third 'M' was put forward by Mr Deng in the early 1990s, which is that do not ask whether it is socialist or capitalist in the process of economic reform and construction. 'Do not ask' translated into Chinese is 'Mowen' which formed 'Mowen (don't ask) theory'. The Mowen (don't ask) theory completely cleared all the ideological obstacles that blocked the Chinese economic reform in the early 1990s and afterwards.

[6] The CBEs were rural non-farm enterprises owned either by the communes or by production brigades. The existence of CBEs can be traced far back to the Great Leap Forward period. Their objective was supporting agricultural production. Apart from this, any other collective non-farm activities were not encouraged or permitted in order not to divert resources from heavy industry. Most of the CBEs were not based on China's

Later a series of more radical reform measures were carried out, namely the abolition of collectivised agriculture and the countrywide implementation of the Household Production Responsibility System (HPRS) that returned the land to rural households on the basis of long term lease. Institutionally, by 1983 the People's Communes and production brigades and production teams were replaced by township and village.[7] Then collectivised agriculture was completely supplanted by household farming. The farmers' responsibility was that they turn over a percentage of their output to the state. After meeting the state's target they can freely deal with the rest of their harvest.

The results of the rural reform were remarkable. First, there was a very rapid increase in agricultural productivity, grain output, peasants' income and savings in the early years of reform. Grain output rose from 304.8 million tons of 1978 to 379.1 million tons of 1985 and further to 504.5 million tons of 1996 (State Statistic Bureau, 1997: 383). In the mean time, the urban-rural income per capita ratio fell from 2.36 of 1978 to 1.88 of 1985 (Table 1.2). This was the only period when peasants' life was improved relatively to urban residents since the People's Republic was founded. Second, it was revealed that there was a vast amount of rural surplus labourers released from collective agriculture.

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comparative advantages, i.e. abundant labour. Due to poor management and no incentive for working hard, the majority of the CBEs were economically and technically inefficient, particularly in the period of the Great Leap Forward. Detailed information about the CBEs is presented in Table 1.1.

[7] The Chinese administrative regime has various levels: central government, province, county, township (formerly commune), and village (formerly production brigade). They vary greatly in group size: in 1988, rural population per county averaged 364,000, per province 28 millions (Knight & Li, 1997). The typical township has a population of 15,000-30,000. Villages generally have a population of 1,000-2,000 (Byrd & Lin, 1990: 3). In China "rural" refers to only townships and villages, i.e., county cities are excluded. "Rural" is not strictly a spatial definition, but a combined spatial-ownership-level concept (Ho, 1994: 7). There are three levels of rural communities in China. The township, now the lowest level in China's administrative hierarchy, has an articulated government structure. The village is not a separate level of government but has governmental functions and a community structure. The production team (village's small group) is purely a community structure, having lost most of its administrative functions as a result of the implementation of the household production responsibility system in agriculture in the early 1980s. The general term of community government is used to refer to authorities at all the three levels (Byrd & Lin, 1990: 3).

Relaxation of state control over industrial and commercial sectors. At the same time as abolishing collectivised agriculture, the Chinese government also gradually relaxed control over industrial and commercial sectors in the period 1979-1984. As long as they had the permission of the brigade, individuals were permitted to operate all industrial, handicraft, commercial, food and beverage, services, repairs, transport and house renovation (Ho, 1994: 22). In the terminology used by Chinese authorities, "individual" enterprises refer to those employing less than eight workers. Establishments employing eight or more workers are termed "private" (Li, 1995). Rural free trade market was also sanctioned. Apart from mainly serving agricultural production and local needs, the CBEs were allowed to run construction teams in urban areas and to serve the needs of large-scale industry and to export. By 1983 peasants were permitted to conduct trade of selected goods between counties and between provinces after they met their contribution to the state (Sun, 1992: 450). By 1984 rural private enterprises were formally recognised and peasants were authorised to own motor vehicles and boats, and to engage in transportation services (Ho, 1994: 23).

During the period from late 1978 to 1984, government policies towards non-farm activities or rural enterprises were in the process of deregulation. From 1985 onwards, the objective of the governmental policies entered a stage of improving, modernising and pushing rural enterprises forward to the international market. The slight recession following the 1989 Tiananmen Event was turned into a boom by Deng Xiaoping's southern speech in the spring of 1992 (Footnote 5). What's more, the Deng Xiaoping's southern speech cleared all the ideological obstacles that had blocked Chinese economic reforms before.

The series of reforms of the agricultural sector and rural non-farm activities resulted in a tremendous development of rural enterprises. By 1995, township and village

enterprises (TVEs) employed 129 million rural labourers which was more than the state-owned sector did (in the same year, the state-owned sector's employment and total urban employment were 112.6 million and 173 million respectively) (State Statistic Bureau, 1996). In the same year, TVEs' industrial gross output value accounted for 56% of Chinese total's (State Statistic Bureau, 1996).

Relaxation of the *hukou* system and rural-urban migration. The fact that peasants are allowed to run businesses in urban areas and to trade between rural and urban areas, even across provinces, was an actual relaxation of the *hukou* system and rural-urban migration control. By 1984, rural residents were formally permitted to migrate to small towns below the level of county cities with a move of *hukou* as long as they took full responsibility for their own food quota (Gao, 1997). Also in the 1980s, state-owned enterprises were given certain autonomous powers in the recruitment of labour. At the same time, the SOEs found out that use of temporary workers helped them to cut costs. However, number of migrant workers employed by SOEs was capped by municipal labour departments in order to control rural-urban migration (Solinger, 1999: 51).

Having considered the institutional deregulation of rural-urban migration, we now look at how the 'pull' factors affecting rural-urban migration. Income gaps represented by the ratio of urban to rural income per capita (in the range 1.88 to 3.30) have existed throughout the period (Table 1.2). Besides, the high quality of urban life has always been the dream of Chinese peasants. What's more, the central government's special economic treatment of the southeast coastal region and foreign investment as consequence of the open door policy led to rapid economic growth of the region. This generated an urgent need for a low-paid and flexible labour force (Solinger, 1999: 47). Additionally, the nationwide fast-growing non-state and foreign-owned industrial and service sectors have

become major suppliers of jobs for both the urban-born labour forces[8] and rural-urban migrants. Of these jobs, some in the service sector such as fresh food suppliers, dirty menial workers, family servants and all sorts of others sometimes could only filled by migrants because urban dwellers are ashamed of these jobs. In other words, the relaxation of the *hukou* system or rural-urban migration control as well as the huge labour demand caused by the economic reform and open door policies resulted in rural-urban human migration on a scale unprecedented in the whole Chinese history. By the mid-1990s, the number of rural-urban migrants were about 70 million (Solinger, 1999: 18). In 2001, 88 million rural-urban migrants worked more than three months in urban areas (Zeng, 2002). The 1999 urban household surveys conducted by Chinese Academy of Social Sciences (CASS) show that 88.5 percent of rural-urban migrants were self-employed or employed in the non-state sector. Certainly, this super-large scale of rural-urban migration was also driven by a 'push' factor, namely, the enormous amount of surplus rural labourers released by the abolition of collectivised agriculture and the return of land to rural households.

However, up to now it is still extremely difficult for rural-urban migrants to get urban *hukou*. In other words, rural-urban migrants are still kept on a temporary basis.

The effect of the economic reform on the human development institutional arrangements (HDIAs). Although rural peasants are allowed to work and live in cities, they *still* can't get access to urban *hukou* and any urban HDIAs, such as free medical care and free education for children. Moreover, rural-urban migrants' children were even not allowed attending any urban state schools unless their parents pay a lump some of money, whereas children with urban *hukou* get free school education. Apparently, few migrants

[8] The domestic non-state-owned and foreign-owned sectors employed 44.7 percent of the whole urban labour force in 1995, whereas the corresponding figure in 1978 was 21.7 percent (Table 1.2). Note these statistics reported by the Chinese Sate Statistic Bureau are only concerned with workers who have urban *hukou*.

could afford that amount of money. What's more astonishing is that private low-cost schools aiming at providing education for rural-urban migrants' children are not sanctioned to exist. In short, people without urban *hukou* are *still* extremely discriminated against. In general, the urban-rural segmented, divided and urban-biased HDIAs *still* remain largely unchanged after the reform; those high quality HDIAs enjoyed by people with urban *hukou* especially the state employees are *still* funded by the state budget, whereas those much weaker and worsening HDIAs available to peasants *still* have to be financed by the poor local townships and villages; peasants *still* can't get any financial aid from the central state budget to finance and improve their HDIAs although they have been paying tax to the central state budget all the time.

In detail, the abolition of the collectivised agriculture led to the collapse of the free medical care system to rural residents. The commune health centres are replaced by the township clinics, which charge for any services; the 'barefoot doctors' have become village medicine men, who survive by providing some basic medical needs as well as selling medicine to locals. Fortunately, the nine-year compulsory school education system still exists and is protected by the state legislation, although it is financed locally.

Rural surplus labour. As of 1995 rural China was endowed with 450 million labourers (Table 1.2) but only 94.97 million hectares of cultivable land (0.211 hectares per rural labour) (the State Statistical Bureau, 1997: 368). The average arable land per rural labour was less than a third of the world average. The existence of surplus labour in rural China is supported by the following evidence. From 1978 to 1996, the country's grain output increased 66 percent (from 304.8 to 504.5 million tons), whereas during the same period the number of rural labourers engaged in agriculture only rose by 13 percent (from 284.6 to 322.6 million) (Table 1.1). Note that also in the same period, the rural labour force

has risen by 47.82 percent (from 306.38 million to 452.88 million) (Table 1.1). By 1995, 29 percent of rural labourers had moved off-farm without affecting agricultural activities negatively at all (Table 1.2). Were it not for more than a hundred million rural labourers going off-farm, Chinese agricultural productivity of labour would have been reduced by 41% even without considering how much the income level of rural residents had been raised by the earnings of those going off-farm.

Despite its importance, Chinese official statistics did not provide any information about rural-urban migrants. It is commonly estimated that there were about 70 million rural-urban migrants in the mid-1990s across China (Solinger, 1999: 18). There shouldn't be any doubt about the number of total rural labour force. Besides, the number for rural labourers who engaged in local non-farm activities also should not have problem because the government had a good statistics for them since the mid-1980s. Thus, surprisingly, the numbers about rural labour force would not add up had rural-urban migrants been taken into account. Consequently, the problem might exist in the official statistics about the number of rural labour engaged in agriculture. Because the Chinese government had not begun collecting information about rural-urban migrants at the village level, out-migrants might be classified as agricultural workers. If this were the case, the number of rural labourers involved in agriculture in 1995 would be about 250 million instead of 322.6 million, and hence the rural labour force in agriculture would have fallen by about 11 percent compared to the counterpart figure of 1978. Therefore, it might be a picture that, during the period of 1978 to 1995, China witnessed grain output increasing enormously but the labour force involved in agriculture decreased continuously, with about 45 percent (about 200 million) of rural labour force going off-farm. Note that Chinese agriculture has been run on the basis of household farming, which means that rural labourers going off-

farm is an instance of individual or household behaviour without intervention from the state.

Previous studies (Knight & Song, 1997; Cook, 1999; Song, 2000) showed that the returns to labour in non-farm activities were much higher than in household farming. This microeconomic evidence suggested that there is still room for Chinese rural labourers to go off-farm. Meanwhile, the urban-rural income gap has continuously risen since the mid-1980s. This economic factor will continuously attract more rural-urban migration. However, non-farm opportunities either in cities or in villages are constrained by the demand side rather than by the supply side.

The new development of Chinese economic reform since the mid-1990s. Since the mid-1990s, Chinese economic growth rate has fallen from two digits to single digits due to weak market demand. To maintain an annual 7 percent growth rate, the Chinese government has been struggling by launching a number of public infrastructural construction projects financed by a state budget deficit on a large scale. At the same time, there is nationwide deflation. Nonetheless, a more radical reform known as *xia gang* was launched by the Zhu Rongji cabinet (which came into office in 1998) aiming at improving state-owned enterprise efficiency by reducing over-manning. As a consequence of the massive retrenchment of workers by many SOEs (state-owned enterprises), considerable pressure has been put upon labour market throughout urban areas across the whole country (Appleton *et al.*, 2001 & 2002). The *xia gang* policy has led to tighter controls on migrants, aimed at restricting their numbers and in this way assisting retrenched urban workers.

Also since the mid-1990s, the Chinese government has altered its stance on the ownership of rural enterprises. Most TVEs (township and village enterprises) have now been privatised (Oi, 1999; Fong, 1999), and this would tend to lessen the degree of overt

political considerations at work. At the same time, the imperative of finding off-farm sources of employment has intensified in the countryside. This is partly because of the stagnation of agriculture; in fact, the sector has not experienced much recent growth following the dramatic success in raising grain production immediately brought about by the 1978 reform (Oi, 1999). By the 1990s, urban-rural income inequality measured by the ratio of urban-rural income per capita had regressed to the pre-reform level (Table 1.2; Yao & Zhu, 1998; Yao, 1999(b)). In addition, many local governments now levy punitive – and notoriously arbitrary - taxes and 'fees' upon both rural enterprises and individual residents. Another worrying trend is that after a period of explosive growth, over the last few years, rural off-farm enterprises have entered a phase of consolidation and even begun to experience recession (Oi, 1999).

Rather than boosting market demand, China's recent entry into WTO would strip off the state protection against cheap and high quality grain imports, and end state-subsidies of grain exports. Certainly, this is not good news to the peasants who struggle on grain farming (Hua & Liu, 2002).

1.3 Issues and related theories

The task of this section is to outline the issues relevant to rural household income generating activities and to review the related theories. These issues and the related theories constitute the themes of this thesis.

1.3.1 Surplus labour and rural-urban migration

As we have seen from the last two sections that, a fundamental issue haunting China has been its enormous amount of surplus labour. All economic or social studies about China can not avoid this profound issue. In other words, it is a starting point for a study of rural household income generating activities on which this thesis is focused.

Lewis (1954) dual model is about the development process of countries with surplus labour. Accordingly, in some less-developed countries (LDCs) where 'population is so large relatively to capital and natural resources,' there are two economic sectors with an 'unlimited supply of labour'. One is 'traditional' sector in which labourers are essentially self-employed either in peasant household farming or petty trade. The motive for employment, either self-employed or hired, is mainly for consumption. The price of labour is based on the subsistence level. The other is the 'capitalist' sector, in which the exogenously given real wage exceeds earnings available in the 'traditional' sector and employment is constrained by the demand side rather than the supply side. Given the wage and technology, the capital-labour ratio and the profit rate are determined by profit maximization; meanwhile the scale of the capital stock determines the employment level in the 'capitalist' sector. In this logic, the continuous expansion of demand for labour wouldn't drive up the real wage, because the labour reservoir formed by the surplus labour or disguised unemployment and the urban unemployed would not be exhausted until the economy graduated from the class of 'developing'.

What the Lewis dual model said seems largely in accordance with China's experience after reform. For example, 45 percent of her 450 million rural labour force has gone off-farm either locally or by rural-urban migration; the difference in returns to labour between non-farm activities and farming would continuously drag labour off-farm; and the existence of big urban-rural income gaps would steadily pull labour out of the countryside

(Section 1.2). Besides, according to the Lewis theory, surplus labour will exist and rural-urban migration will continue until China is transformed into a developed country. Although unskilled workers' real wage rate would not rise, the wage rate of skilled workers especially those with international recognised skills certainly would go up since their supply is by no means 'unlimited'. Therefore, perhaps only the supply of unskilled labour (especially rural-urban migrants) is perfectly elastic.

In the field of rural-urban migration, the dominant model was proposed by Todaro (1969) and Harris and Todaro (1970). According to **the Harris-Todaro model**, migration is a phenomenon of economic disequilibrium, and workers migrate between sectors until expected incomes are equal. An individual's decision to migrate from rural to urban depends on the real urban-rural income difference and the probability of obtaining an urban job. The key institutional assumptions of the Harris-Todaro model include: the rural labour market is competitive; the urban formal sector (formed by modern manufacturing firms) hires labour at a wage higher than market-clearing level (imposed by trade unions or government policy); only urban residents can apply for jobs in urban formal sector; along aside the urban formal sector, there is an urban informal sector in which both urban residents and rural-urban migrants could make living. A typical migrant can be viewed as arriving in the urban area and joining a large pool of unemployed and underemployed workers in the urban informal sector. The probability of obtaining a job in the urban formal sector is defined as the number of modern sector vacancies divided by the number of job seekers in the urban area. The Harris-Todaro model argued that, because expected urban income is defined in terms of wage and employment probability, rural-urban migration will not stop in spite of the existence of sizeable rates of urban unemployment.

In fact, once the fixed wage assumption of the Harris-Todaro model is relaxed, the migration equilibrium still looks as the conventional Harris-Todaro model (Bardhan & Udry, 1999: 55).

Except for the competitive rural labour market, the Harris-Todaro model's institutional assumptions suit the urban sector of the after-reform China well. Indeed, there are formal and informal sectors. Only urban residents (residents with urban *hukou*) can apply for a job in the formal sector that is largely controlled by government. The majority of the rural-urban migrants are employed or self-employed in the informal sector. In spite of this, rural surplus labours have continue migrating to urban sector.

1.3.2 The double character of the rural household

The main economic units in the after-reform rural China are households. This thesis examines rural income generating activities from the perspective of the rural households. Thus, theories about the rural households are key to the analysis.

A typical rural household is characterised by its being a family and an enterprise, a consumer and a producer at the same time. The earliest model concerning the rural household is **Chayanov's** (1925) **peasant household model**. According to Chayanov model, a peasant household maximises its utility. Chayanov's main assumptions are: (a) there is no market for labour; (b) farm output can be retained for home consumption or sold in the market, and is valued at the market price; (c) all peasant households have flexible access to land for cultivation; (d) each peasant community has a social norm regarding the minimum acceptable consumption level. Combining the characteristics of

consumer and producer, a peasant household's decision making is based on the requirement of satisfying the consumption needs of the household and the amount of family labour. This subjective decision is seen as a trade-off between the drudgery or irksomeness of farm work (disutility of work) and the income required to meet the consumption needs of the household. The main factor influencing the trade-off is the size of the peasant household, and its composition between working and non-working members, i.e. the demographic structure of the household. Because of the existence of the flexible access to land, it defers the onset of diminishing returns as labour use increases. In other words, the production function may have a linear or near linear portion (constant marginal returns) before diminishing returns set in. In essence the model is a demographic explanation of household motivation. In the words of modern economics, a peasant household's consumption and production are non-separable.

Clearly, the Chayanov model and its assumption do not suit rural China, where land is limited and almost half of the rural labour force has gone off-farm. However, due to poor information and the weak state of communication links, rural labour markets are, in many respects, both incomplete and imperfect so that household demographic factors might still affect rural households' decision-making process.

After the Chayanov peasant household model, modern economists have also proposed the **agricultural household model** (Singh *et al.* 1986). It is supposed that in a complete or perfect market, an agricultural household with two members possess a utility function and a budget constraint that incorporates production using assets owned by the household. Each of the two members gets utility from consuming a share of total consumption good C and from leisure (l_1 and l_2), so that the household utility function is:

(1) $MaxU(l_1, l_2, C)$

subject to

(2) $C + w(l_1 + l_2) \leq \pi^* + w(L_1^f + L_2^f + L_1^m + L_2^m) + rE$

where w is market wage rate; L_i^f denotes family member i's time on own farm; L_i^m denotes family member i's time on market wage jobs; r is rent for land and other property; E denotes the land and other property owned by the household; finally π denotes profit from own agricultural production:

(3) $\pi^*(w, r, p) = F(L, A, I) - wL - rA - pI$

where L denotes all labour time (including hired labour) used on agricultural production; A denotes all land (including hired land) used; I all other inputs, vector p denotes vector I's prices.

Under the circumstances of complete or perfect markets, the agricultural household would firstly pursue profit maximisation from its agricultural production from Equation (3) on the basis of the market prices for labour, land and other inputs. In other words, if complete or perfect markets exist, agricultural households' production and consumption decisions are separable. Then the household decision making process are in two stages, first, agricultural profit is maximised, and then household utility is maximised constrained by the given income budget. In short, the household agricultural production and

consumption process is recursive. If labour and land markets are imperfect or incomplete, or in the case of subsistence farming, these decisions are made simultaneously.

Clearly, the agricultural household model is implicitly a **unitary model of the household**, which supposes that a family pools its income and maximises utility from total family consumption and their members' leisure subject to a family budget constraint. Such unitary models have been criticised for treating the family decision making process like 'a black box', more fundamentally as not being built on individualism – the core of the neoclassical microeconomics (Chiappori, 1992), and as being inadequate in explaining intra-household inequalities. To overcome these drawbacks, **collective model**s have been proposed, which suppose that members of a family share non-labour income according to some given rules, and that each family member is characterised by specific preferences and hence optimally chooses his/her own consumption and labour supply (Chiappori, 1992). In rural China or other developing countries, the agricultural household - with its workers exclusively working on its own farm and no hired labour - functions as a family enterprise. Its income is the outcome of the family's collective effort such as decision making, management, labour, etc. Within the household, how much a working member should work and can earn cannot be fully explained by her/his own human capital, because it is decided at the household level, and profoundly influenced by the household production function incorporating existing agricultural technology and the household's management ability. Therefore, whether the unitary model or the collective model is more suitable to rural China is uncertain and worth exploring.

1.3.3 Diversified rural households

Surplus labour, shortage of land and low returns to agriculture would certainly encourage or even force some rural households to diversify their income generating activities in order to secure more employment for their surplus labour and to generate more income. In rural China, possible options for diversification of income sources include choosing more labour-intensive and less land-intensive agricultural activities, local non-farm family business, local wage employment and rural-urban migration.

Diversification could be seen as risk-averse behaviour, for an example, Stark (1991) argued that a household could reduce the variance of its income by spreading its labour across different activities providing there is less than perfect positive correlation between incomes from different activities. This "**portfolio investment**" in urban earning activity by rural-urban migrants as a risk-alleviating device assumes, in particular, that economic activities in the urban sector is statistically independent of agricultural production. Rural-urban migration is one of the main options for spreading risk.

However, it isn't clear-cut whether rural households' diversifying behaviour is income-driven or security-motivated. In rural China, subsistence-farming-dominated rural households' diversification could be driven by a desire to raise income, whereas non-farm-activities-dominated households still not abandoning household farming might be seen as risk-spreading. However, even only engaging in farming activities, poor small-farmers are also of necessity of risk-averse because they cannot afford not to cover their household food needs (Lipton, 1968).

Aside from consideration of income generation or risk-spreading, households or individuals' characteristics can also influence their diversification behaviour. On this issue, Knight and Song (1997) postulate a theory about rural labourers' choice of income generating activities based on neo-classical economics. Accordingly, even when marginal returns are the same across different activities, heterogeneity among workers can give rise to clear preferences. There can be heterogeneity in tastes as well as in productive characteristics. In equilibrium, the market sets a value on taste, in the form of a compensating wage differential. Those with stronger taste for migration will derive rent from migrant labour, and so will prefer it to other activities. Unless there are problems of joint supply of characteristics, rents of characteristics are competed away. It is heterogeneity not of productive characteristics but of tastes, therefore, that gives rise to worker preferences among activities in competitive equilibrium. In competitive conditions, labour allocation among activities is therefore influenced by preferences and productive characteristics. Preferences should be interpreted broadly to include the attractiveness of an activity to an individual and the transaction costs faced by the individual. Among the factors governing taste for an activity might be age and gender (for instance, young men are keener to migrate than others). Transaction costs might be reflected in the local availability or otherwise of rural industry and the cost of migration (workers with non-farm opportunities at hand or nearby have an advantage). If there are differences in production functions across activities, the equilibrium distribution of productive characteristics among activities will be uneven.

1.4 Fieldwork: a rural household survey

The research is based upon a dedicated survey of rural households conducted in 1998. The area comprises a cluster of villages located in Xinmin County of the northeastern province of Liaoning. This is situated some 50 *km* west of Shenyang, the provincial capital. Shenyang is one of the largest cities of the PRC with a current population of around four million. It enjoys front-rank status in terms of heavy industry. Xinmin is well placed in terms of transport and communications, and enjoys relatively favourable endowments of cultivable land and other natural resources. For example, its arable land per capita of the rural population is 4.9 *mu* (0.326 hectares), and per rural worker, 13.6 *mu* (0.906 hectares). These averages are well above Liaoning's and indeed most other provinces in the country at large (Table 1.3). Population pressure upon land is therefore not quite as acute as elsewhere.

The southeast of Xinmin, which lies to the east of the River Liaohe and just to the south of the main-line railway, is the richest and most developed part. This is because of its close proximity to both Shenyang and the nearby oil field. In contrast, the rest of the county is much poorer. Case studies of households such as ours, based as they are upon detailed fieldwork investigation, can never claim to be representative of rural areas in general in a country the size and population of the PRC. However, we maintain that as these relatively fertile and land-rich households in Xinmin county evidently still feel a pressing need to diversify their sources of income, either by engaging in less land-intensive forms of additional cash production or by entering off-farm activities, then other less well-endowed parts of China are more likely to face even greater pressure to move away from conventional grain farming.[9]

[9] The other reason that Xinmin County was chosen as my fieldwork area is that as a research student, my financial resource is very limited so that I have to choose an area where I have strong contacts and associates in order to facilitate my fieldwork. This is the major behind motivation.

The spatial variation within Xinmin afforded the opportunity of drawing from different types of rural household. Nine villages were selected. Following a consultation exercise with officers working for the county's Department of Statistics, the villages, drawn from townships from throughout the county, were identified so as to capture as much diversity as was practicable.[10] In each village, fifty households were chosen randomly based on a list of names obtained from the local government.[11] In brief, their individual characteristics may be described as follows. Villages coded 2 and 9 possessed the most developed privately owned OAEs in the county. Villages 4 and 5 had relatively well-established OAEs, partly because of their closeness to thriving market townships. Village 3 had an advanced, mixed, commercial agricultural sector; whereas Village 7 enjoyed a reputation for cash crop farming, especially vegetable seeds. Village 6 was well-known for its collectively owned non-farm enterprises, although its residents were as poor as those in Villages 1 and 8 – both of which were almost entirely reliant upon subsistence pursuits. As we conducted the fieldwork ourselves and visited each household in every village, we have full confidence in the integrity of the primary sources.

We were able to distinguish three main categories of income-generating households:

(1) 259 (58.6%) "Agricultural Households" [AHs]:

- 128 (30%) were almost exclusively engaged in conventional grain-oriented farming;
- 131 (28.6%) practised mixed grain farming with cash-crop production.

[10] There are about six types of villages within Xinmin County: industrialised villages, villages with developed commercial activities, villages with traditional advantages such as industrial skills and cash-crop farming, villages with developed collective non-farm enterprises, and poor agricultural villages. The village samples are chosen to represent the types of villages and the proportion of each type of the villages. For example, two villages mainly engaged in agricultural activities are selected to represent its proportion.

[11] For example of a 200-household village, 50 households are chosen from every other four of the 200 households according to the order of the village's household namelist provided by the village authority.

(2) 134 (30.3%) "Diversified Households" [DHs]:

- 86 (19.4%) combined agricultural pursuits with wage employment in an off –farm activity (OFA hereafter);
- 48 (11%) combined agricultural pursuits with running an OAE.

(3) 49 (11%) "Non-Agricultural Households" [NAHs]:

- 15 (3.4%) were engaged in wage labour in OFAs;
- 34 (7.6%) operated exclusively an OAE.

In the rest of this section, the characteristics of each village will be described in the order of poor to rich (detailed information about the sampled villages and households are also presented in Tables 1.4 - 1.8).

Village 8 is the poorest of our sampled villages (annual income per capita was only 340 Chinese yuans in 1997). Only very recently can the village and the township to which it belongs get access to a highway. Even up to the time when this fieldwork was conducted, this township did not have an organised country market, which is a common establishment of nearly all other townships in the county. Majority of the village's residents did not bother to mix maize and wheat planting but buy wheat flour for consumption. While in other sampled villages, mixing maize and wheat planting has become a norm, which not only helps maize growing but also solves the problem of the villagers' consumption needs of wheat flour. In term of population, the village is at the middle level (1998 residents) but rich in land (4.85 Chinese *mu* per capita) with corn and wheat as its main crops. Its non-farm activities are the least developed of our village samples, with only thirty-nine people

engaged in local OFAs and twenty out-migrants. Apart from several local groceries and grain processing businesses, its typical local OFAs are local transportation (fifteen households have this kind of business).

Of the fifty sampled households, only 11 or 22% engaged in both farming and non-farm activities.

Village 6 is the second poorest of our village samples (annual income per capita was 483 Chinese yuans in 1997) although it sits along two main highways. The village is famous for its collective-owned non-farm enterprises that have created 115 non-farm waged jobs for the villagers; in contrast, none of other sampled villages had collective-owned non-farm enterprises. This is because the village was lucky to have a very entrepreneurial village head. In population it is a middle-size village but with the highest level of arable land (5.58 Chinese *mu* per capita). Apart from the main crops of corn and wheat, the residents of the village also grew cash crops like sugar cane and vegetable seeds organised by the village community committee. In addition to the collective-owned enterprises and several groceries and repair shops, the village main non-farm activities were family-owned transportation services and restaurants. 42 percent of fifty sampled households of the village had diversified into OFAs of which the majority were local wage jobs in the collective-owned enterprises.

Village 1 is the third poorest of our village samples (annual income per capita was 1,017 Chinese yuans in 1997) and the township to which it belongs is also one of the poorest townships of the county. The village is quite far away from the highway and even its township (5.5 km). Residents of the village live in shabby houses; they appear to be simple and honest, lacking in commercial sense. In population it is the second smallest

village (1180 people) but with a middle level of arable land per capita (3 Chinese *mu*), and with rice and corn as its main crops. Its non-farm business and number of non-farm jobs created (32 non-farm-employed jobs) are low relative to the sample but the level of out-migrants working outside the township is about average (37 out-migrant workers). In other words, its residents mainly rely on household farming. Needless to say, the village's non-farm activities are underdeveloped. There are only some common rural non-farm businesses like local groceries, grain processing and tiny restaurants. Seven households own restaurants; five of them are at the township locale; two of them are outside the township. Six households owned local grocery shops, and sixteen households engaged in transportation business.

Of the fifty sampled households, only 26 percent had diversified into non-farming activities: six are DHs with non-farming employed jobs; four are DHs with OAEs; three are NAHs with OAEs; there is only one household with all its labour in non-farm employment.

Village 3's annual income per capita (1,217 Chinese yuans in 1997) is at lower middle level. Next to the township of Village 2, the township of Village 3 is the second closest to Shenyang – the provincial capital alongside the main highway that also connects Xinmin county city to Shenyang. However, the village is a bit far away from the township locale and the highway (5 km). In population it is a middle-sized village (1,865) but with relative low level of arable land per capita (2.7 Chinese *mu*). The village has the highest number of people engaged in local OFAs (555 people) and out-migration (73 people). In term of the number of immigrant workers, the village ranked the third after Villages 2 and 9. However, only ten of the fifty sampled households had diversified into OFAs. 83 percent of the village's lands were used for rice production.

Village 7's annual income per capita (1,443 Chinese yuans in 1997) is also at a lower middle level. Although being far away from its township and highways, both this village and its parent township were famous for their vegetable seeds that are sold in many provinces of the country. Its non-farm activities are even less developed than those in Village 8. In population it is lower middle-sized village (1345 people) but with the highest level of arable land per capita (5.39 Chinese *mu*). Apart from grain like corn and wheat, the majority of its land grows vegetable seeds that are much more profitable than grain.

Of the fifty sampled households, 28 percent had diversified into non-farm activities, whereas the rest were engaged in vegetable seeds farming.

Village 9's annual income per capita (2,516 Chinese yuans in 1997) is at a middle level. It is not far away from its township but a bit away from highways. However, the village is famous for its private business of processing plastic products. In total, the village had 65 enterprises of this kind. Apart from self-employment, these private enterprises also created 315 non-farm waged jobs; of them, 215 were occupied by the villagers, the rest went to the workers from other neighbour villages. As a result, 60 percent of the sampled households in the village were engaged in this particular business. In population it is small, with only 970 residents but its level of arable land per capita is the highest (5.50 Chinese *mu*). Its main crops are rice and corn; forty-three percent of its land were used for rice.

Village 4 is the third richest of the sampled villages (annual income per capita 3,714 Chinese yuans in 1997). The village is just located at its township which is the next neighbour to the township of Village 3 and also on the main highway connecting Xinmin county town to Shenyang, but it is closer to Xinmin county town (20 km) than to Shenyang

(50 km). This township locale is famous for its country market in which lots of businesses are conducted, such as garment, timber, vegetable seeds, food and vegetables, house decorating, restaurants, transportation, etc. On scheduled market day, tens of thousands gathered there either trading or shopping. This is why the village has more than two hundred businesses related to transportation services, garment and restaurants. Besides, in term of the number of people involved in non-farm activities, the village ranked second of the sampled villages, with 376 employed or self-employed non-farm workers. Coincidently, the village also ranked the second in population but its arable land per capita is the lowest (2.18 Chinese *mu*) with corn and wheat as main crops. Of the village's fifty sampled households, 54 percent had diversified into non-farming activities.

Village 5 is the second richest of the sampled villages (annual income per capita 4,389 Chinese yuans in 1997). The village is also located at its township locale but far away from the main highway, and is alongside a lake that had already been developed as a famous sightseeing area. This is why the village had 300 labourers engaged in non-farm activities. Although half of the village's households were still in agriculture, they had extensively diversified into aquatic products (fish) and animal husbandry. For example, there are 900 Chinese *mu* of fish ponds in the village. The village ranked number one of the sampled villages in population but has the second lowest land per capita (2.18 Chinese *mu*). In term of non-farm activities, the village is at the same level with Village 4. The main crops of the village are rice and corn. Of the 49 valid sampled households, 47 percent were engaged in non-farming activities.

Village 2 is the richest and most prosperous of all the villages under the administration of Xinmin County (annual income per capita 5,421 Chinese yuans in 1997).

The reason for this is that the village is very close to and along the main highway leading to the provincial capital – Shenyang (only 15 *km*). The township to which the village belongs even has an industrial estate. The villagers' houses were of good quality by local standards. Some rich residents even bought apartments of the apartment buildings in the nearby town[12]. The village hall is a three-storey building, very rare among villages in Xinmin County. Its non-farm sector was so developed that 489 non-farm waged jobs were created; of them, 289 were occupied by the villagers (which accounts for 58% of the village's labour force) and the rest went to immigrant workers. Besides, 74 peoples worked outside its belonged township. The village had some important industrial projects such as an electric cable manufacturer that employed 46 workers, a soft drink factory, a construction material manufacturer, a tractor garage, a garment factory, several electronic appliance mending shops, forty-five transportation businesses and seven hotels. Of course, there are some rural ordinary non-farm businesses as well like local groceries, grain processing and mending shops. Its arable land per capita (2.21 Chinese *mu*) is almost at the lowest level of the sampled villages with rice as main crop. Of the fifty sampled households, 74 percent had diversified into non-farm activities.

In the summer of 1999 when I went to this village again to collect some missing values[13], the village accountant told me that the village just taken in about 70 migrants who migrated due to a reservoir constructed in their original village. I asked whether this would put more pressure on its limited arable land. The accountant answered that, not only wouldn't it put any pressure on its land but also the migrants could take farming jobs left behind by the villagers going off-farm.

[12] Peoples in the northeast rural China prefer flats in town to houses in villages.

[13] The missing values arose from that some non-farm households were unable to report their self-estimated household agricultural capital values. The reason for this is that some non-farm households mainly earn their income from non-farm activities so that their agricultural capital is negligible and not reported. However, the household capital value is a key variable for estimating household production. To solve this problem, I went back to these nine villages to collect these missing value in the year of 1999.

1.5 Earlier studies and the organisation of the thesis

The earlier studies. There are numerous studies [14] on Chinese rural income generating activities. Certainly it is not possible to cover all of them here. Therefore, only the studies based on Chinese rural household surveys and closely related with this thesis are to be reviewed.

A major study on Chinese rural labourers' choice of occupation was done by Knight and Song (1997). Based on the 1995 nationally representative rural household survey conducted by Chinese Academy of Social Sciences (CASS), Knight and Song examined the allocation of labour among farming, local non-farm and temporary migration activities. Both individual and household characteristics were used to model the unconstrained and constrained choices. They found out that not only the preferences of workers but also their productive characteristics and the opportunities available to them were relevant, and the returns to non-farm activities greatly exceed those to farming. There was clear evidence that peasants were constrained in their choice of non-farm activities. The constraints include restricted access, imperfect information and risk, and transaction costs. The relaxation of those constraints is vital for rural development in China.

Knight and Li (1997) investigated cumulative causation and inequality among villages of China using a survey of 1000 households in seven villages in Hebei province. They found out that, apart from a good natural resource endowment helping to initiate development, the main causes of differential village development are non-farm sources of

[14] Such as Parish *et al.* (1995), Knight & Li (1997), Knight & Song (1997), Sato (1998), Cook (1998, 1999), Rozelle *et al.* (1999), Song (2000), Hare & Zhao (1996), Hare (1999), Zhao (1999), Liu & Zhuang (2000), Pal (2000), Fan (2000), Yao *et al* (1998), Yao (1999a, 1999b, 2002), etc.

income: migration and village industry. Cumulative causation was claimed to be important in rural development. For instance, migration requires a village network of information and contacts, and village industrialization depends on the accumulation of local skills through a process of learning-by-doing and on reinvestment of profits.

Song (2000) inquired into the determinants and outcomes of diversification of rural household income generating activities also on the basis of the 1995 nationally representative rural household survey conducted by the CASS. She found out that rural households in prosperous regions are more likely to have the freedom to choose high return activities; the larger the size of a village is, the more likely its residents pursue non-farm activities.

Cook (1998 and 1999) explored the determinants of allocation of rural labour between different economic activities and the issue of surplus labour in rural China using a rural household survey conducted in Zouping county of Shandong province in the early 1990s. The findings are that individual characteristics particularly age and gender as well as non-market mechanisms were very important in the transfer of labour into more remunerative activities. Besides, that returns to non-farm activities were much higher than that of household farming suggested that rural households still employed excess labour on farm.

The above are the existing major empirical studies on Chinese rural income generating activities based on different rural household surveys. To my knowledge, one issue, which has not been addressed by the existing literature about rural China, is the determinants of Chinese rural male and female labour participation and labour supply behaviour, which constitutes one of the three main inquiries of this thesis.

Although some of the existing literature on rural China has investigated the diversification of Chinese rural households, this issue is questioned and examined in different ways in this thesis. In detail, the questions to be asked are what determines rural households' choice of income generating activities and what rural households gain from active diversification into a broad variety of income generation activities compared to conventional grain farming. The latter question is to be examined in terms of household income, the level of employment and the returns to labour of household members engaging in a range of rural-based activities. Besides, two explanatory variables are to be constructed as surrogates for income source diversification in a series of household production functions.

Finally, the previous studies had indeed explored the determinants of and remuneration to off-farm activities (OFAs) in rural China which is also one of the three main inquiries of this thesis. However, these previous studies by no means devalue this part of the thesis. The reasons are as follows. First, to my knowledge, this thesis is the first attempt to disclose labour prices and determinants of earnings during agricultural peak time in Chinese context. Second, China is so big in terms of area and population that a typical province is as big as a middle-sized country like Britain or France. Besides, there are so many varieties of climate, culture, geography especially economic development levels, and agricultural cultivation practices and styles across the country that, perhaps the best and practical way of understanding rural China is to study her by province or at least by a cluster of provinces bordered together. Moreover, nobody has conducted a rural household survey in the same area where I went for this thesis. Third, given the rapidity of Chinese economic transition, it seems likely that some of the influences mentioned by the previous studies will steadily erode. For example, since 1995, the government has altered its stance on the ownership of rural enterprises. Most TVEs (township and village

enterprises) have now been privatised (Oi, 1999; Fong, 1999). Moreover, as a consequence of the massive retrenchment of workers by many SOEs (state-owned enterprises), considerable pressure has been placed upon labour markets throughout urban areas across the whole country (Appleton *et al.*, 2001). The agricultural sector has not experienced much recent growth following the dramatic success in raising grain production immediately resulted from the 1978 reform (Oi, 1999). Another worrying trend is that after a period of explosive growth, over the last few years, rural off-farm enterprises have entered a phase of consolidation and even begun to experience recession (Oi, 1999). All these factors would surely re-shape rural economic activities to some extent.

More importantly, I myself conducted the whole rural household survey by using scientific sampling methods with purpose-designed questionnaires. I spent more than four months in the field. I went to the sampled households and villages again and again so that I got relatively good grasp of their economic and social background and current situation. Finally, I myself typed all village and household data one by one into my computer. Later on when I got problems, I went back to the questionnaires over and over to check the correctness of the data so that in the end I almost remember the majority of the sampled households' livelihood, their well-being and even their names. This meticulous way of fieldwork certainly helps me thoroughly understand the people's livelihood of the targeted region and obtain data of high quality. Furthermore, it also makes me interpret the econometric results better and even can deal with some strange econometric results (see Chapter 5 for details). This kind of rigorous study should be valued.

The organisation of the thesis. This thesis consists of five chapters (including this general introduction chapter). Chapter 2 to Chapter 4 are the key chapters in which the focuses are econometric analysis of Chinese rural income generating activities in three

aspects based on the fieldwork of 450 rural households surveyed in a clustering of nine villages in Xinmin County in the northeast province of Liaoning.

Chapter 2 focuses on the determinants of and remuneration to off-farm activities (OFAs) in rural China from the perspective of individual rural workers. A multinomial logit model is deployed to track the distribution of OFA opportunities between wage labour in OFAs, those opting for self-employment in own-account enterprises (OAEs) and out-migrants. With respect to the related issue of financial remuneration, Mincerian earnings functions for wage labour and out-migrants and Translog production functions for the self-employed - both with and without correction for relevant selectivity, are used. Besides, this chapter is the first attempt to disclose labour prices and determinants of earnings during agricultural peak time in Chinese context. The argument is that although the contemporary structure of the rural labour market is far from complete or perfect, there is powerful evidence that conventional market signals – rather than overtly political factors – are becoming instrumental in allocating private OFA wage and self-employment, and in determining earnings.

In contrast with Chapter 2's emphasis on off-farm activities and the perspective of individual workers, Chapter 3 examines both farming and off-farm activities from the angle of rural households. This is because some income generating activities such as off-farm wage employment can only be addressed from the perspective of individual workers, whereas other activities like household farming and family non-farm business have to be studied at household level. Therefore, this multi-angle approach of analysing Chinese rural income generating activities would render us better understanding of it. In detail, Chapter 3 investigates what determines rural households' choice of income generating activities (including household farming) and what rural households gain from active diversification into a broad variety of income generation activities compared to conventional grain

farming. In particular, it is to identify and then measure the effects upon household income, the level of employment and the returns to labour of household members engaging in a range of rural-based activities. Two explanatory variables are constructed as surrogates for income source diversification in a series of household production functions.

In addition to the enquiry into the allocation and remuneration to Chinese rural income generating activities either from the perspective of individual workers or from the angle of households, the multi-angle approach of examining Chinese rural income generating activities should also include a study of Chinese rural labour participation and labour supply behaviour, in particular female labour participation and labour supply. Indeed, there has not been any published work addressing this issue. Therefore, exploring the unknown characteristics of Chinese rural labour participation and labour supply behaviours constitutes the main theme of Chapter 4. The main obstacles for conducting this kind of study are that rural labour markets are incomplete or even barely exist, with the majority of the rural labour force working on their own farms or family enterprises. Hence, market wage rates are not available to most of rural workers. Without them, modelling households or individuals' time allocation seems very difficult. Fortunately, this methodological obstacle has been cleared by Jacoby (1993), who developed a general methodology for estimating structural time-allocation models for agricultural households whose labourers do not work for wages, and applied it to rural Peru. The key of Jacoby's approach is to estimate the opportunity cost time, or 'shadow wage' which is determined from within the household, rather than by markets. By adopting Jacoby's approach, Chapter 4 examines Chinese rural labour supply behaviour.

Chapter 5 summarises and concludes.

Table 1.1 Rural Non-farm Activities 1949-1978

A	B	C	D	E	F	G	H	I	J	K	L
Year	GOV of Total Industries (RMB billion)	GOV of CBEs (RMB billion)	GOV of Industrial CBEs (RMB billion)	D/B (%)	E/B (%)	D/C	Growth Rate	No. of Rural Labour (million)	No. of Rural Non-farm Labour (million)	J/I (%)	No. of CBEs (thousand)
1949	14.02	1.16		8.27					12		
1950	19.12										
1951	26.35										
1952	34.90	1.83		5.24				182.43			
1954		2.20							>10		
1957	70.40	2.30		3.27				205.66			
1958		6.00						154.92			
1959		10.00							18		700
1960		1.98									117
1961		1.98									45
1962	92.00	0.79		0.86				213.73			25
1963		0.42									11
1964		0.46									11
1965	140.20	0.53		0.38				235.34			12
1966	162.40										
1967	138.20										
1968	128.50										
1969	166.50										
1970	211.70	9.25		4.37				281.2			
1971	237.50	10.20	8.25	4.29	3.47	80.88	10.27				
1972	248.00	12.30		4.96			20.59				
1973	274.10	14.10		5.14			14.63				
1974	273.00	16.70		6.12			18.44				
1975	320.70	21.30	17.90	6.64	5.58	84.04	27.54	299.46			
1976	315.80	27.20		8.61			27.70				
1977	372.83	39.10		10.49			43.75				
1978	423.70	49.31	38.53	11.64	9.09	78.14	26.11	306.38	28.27	9.23	1524
Average							23.63				

Note: GOV--Gross Output Value

Sources:

1. GOV of Total Industries 1949-51, 66-69, 71-74, 76, 77 (State Statistical Bureau, 1983: 16-18).
2. GOV of Total Industries 1952, 57, 62, 65, 70, 75, 78-1978(State Statistical Bureau, 1996: 403).
3. GOV of Total Industries 1960 in constant prices (State Statistical Bureau, 1983: 149).
4. GOV of Rural non-farm Activities (Including Sideline and Home Industry) 1949 and 1952 in 1957 constant prices (Ho, 1994: 13).
5. GOV of CBEs 1957-1965 (Zhou, Dillon & Wan, 1992: 204).
6. GOV of CBEs 1970 (Byrd, Lin, 1990: 10).
7. GOV of CBEs 1971-1977 (Zhou, Dillon & Wan, 1992: 205).
8. GOV of CBEs 1978 (State Statistical Bureau, 1996: 389).
9. GOV of Industrial CBEs of 1971, 75 in 1975 constant prices (Ho, 1994: 19).
10. GOV of Industrial CBEs 1978 in Current Prices (State Statistical Bureau, 1996: 389).
11. No. of Rural Labour (State Statistical Bureau, 1996, P91) Except for 1958 (State Statistical Bureau, 1983: 122).
12. No. of Rural Non-farm Labour 1950 (Ho, 1994: 13) and 1959 (Zhou, Dillon & Wan, 1992: 204).
13. No. of Rural Non-farm Labour 1978 (State Statistical Bureau, 1996: 91).
14. GOV of Non-farm activities and No. of these workers in 1954 (Byrd & Lin, 1990: 9).
15. No. of CBEs (Zhou, Dillon & Wan, 1992: 204).
16. No. of CBEs in 1978 (State Statistical Bureau, 1996: 387).

Table 1.2 The economic indicators of grain output, rural-urban employment and income comparison

Year	Ratio of urban-rural income per capita (rural=1)	Grain output (million tons)	Rural labour force (million persons)	Rural labour force engaged in agriculture (million persons)	Total urban employment (million persons)	Employment in state-owned sector (million persons)
1952		163.9				
1956	3.33					
1957	3.48					
1963	2.30					
1964	2.38					
1978	2.57	304.8	306.38	284.56	95.14	74.51
1979	2.42	332.1	310.25	290.72	99.99	76.93
1980	2.50	320.6	318.38	298.08	105.25	80.19
1981	2.20	325.0	326.72	306.78	110.53	80.19
1982	1.95	354.5	338.67	311.53	114.28	83.72
1983	1.82	387.3	346.90	316.45	117.46	86.30
1984	1.83	407.3	359.68	316.85	122.29	87.71
1985	1.95	379.1	370.65	303.52	128.08	89.90
1986	2.12	391.5	379.90	304.68	132.93	93.33
1987	2.17	403.0	390.00	308.70	137.83	96.54
1988	2.17	394.1	400.67	314.56	142.67	99.83
1989	2.29	407.6	409.39	324.41	143.90	101.09
1990	2.20	446.2	420.10	333.36	166.16	103.46
1991	2.40	435.3	430.93	341.86	169.77	106.64
1992	2.58	442.7	438.02	340.37	172.41	108.89
1993	2.80	456.5	442.56	332.58	175.89	109.20
1994	2.86	445.1	446.54	326.90	184.13	108.90
1995	2.71	466.6	450.42	323.35	190.93	109.55
1996	2.51	504.5	452.88	322.60	198.15	109.49
1997	2.47	494.2	459.62	324.35	202.07	110.44
1998	2.51	512.3	464.32	326.26	206.78	90.58
1999	2.65	508.4	468.96	329.12	210.14	85.72
2000	2.79	462.2	479.62	327.98	212.74	81.02

Sources: State Statistic Bureau, 1991-2001.

Table 1.3 Arable land *mu*/labourer (rural) by province (1995)

Heilongjiang	Xinjiang	Inner Mongolia	Jilin	Ningxia	Gansu	Liaoning	Shanxi	Qinghai	Shaanxi
15.1	9.81	9.09	6.28	4.78	3.93	3.89	3.82	3.72	2.55
Tianjin	Hebei	Beijing	Tibet	Hainan	Shangdong	Hubei	Henan	Anhui	Jiangsu
2.54	2.52	2.43	2.33	2.08	1.88	1.87	1.77	1.64	1.61
Yunnan	Jiangxi	Guangxi	Shanghai	Sichuan	Hunan	Guizhou	Fujian	Guangdong	Anhui
1.55	1.50	1.31	1.28	1.20	1.18	1.14	1.03	0.91	0.77

Source: State Statistical Bureau, 1997, pp. 367 and 368.

Note:

1. Land unit – *mu* (1/15 hectares).
2. A good comparison of arable land of different the provinces would be "arable land per rural capita". However, due to the unavailability of statistics for the provinces' rural population, it was necessary to use the provincial total rural labour to divide the provincial total arable land to get the arable land per rural labour by province.

Table 1.4 Characteristics of the sampled villages

Villages	1	2	3	4	5	6	7	8	9
No. of Households	271	470	585	743	748	420	382	536	286
Population	1128	1810	1865	2605	2678	1343	1345	1998	971
Arable land per capita (Chinese *mu*)	3.00	2.21	2.70	2.18	2.10	5.58	5.39	4.85	5.50
Distance to Shenyang (*km*)	55	15	34	50	60	60	60	90	30
Distance to Xinmin county town (*km*)	40	35	30	20	30	40	20	32.5	25
Distance to the township locale (*km*)	5.5	3.5	5	0	0.5	10	10	6	3
No. of jobs created by village owned enterprises	0	0	0	0	0	115	0	0	0
No. of jobs created by village's all non-farming enterprises	32	289	555	376	299	245	25	39	215
No. of out-migrants got non farming job outside own township	37	74	73	15	18	25	23	20	15
No. of immigrants from other township working at the village	5	200	32	20	50	20	35	35	100

Source: the fieldwork survey.
Note: 1 Chinese *mu* equals to 1/15 hectares.

Table 1.5 Agricultural situations of the sampled villages

Village	Ratio of paddy land to total arable land	Area of fish ponds (Chinese *mu*)	Main crops	Cash crops	No. of households that run husbandry
1	0.15	21	Corn, rice	Fruit and cotton	5
2	0.70	300	Rice	Fruit and vegetable	4
3	0.85	1600	Rice	Vegetable and fish	6
4	0.00	40	Corn, wheat	Vegetable	40
5	0.65	900	Rice, corn	Vegetable	150
6	0.00	0	Corn, wheat	Cane, vegetable seeds	80
7	0.00	0	Corn, wheat	Vegetable seeds	5
8	0.02	0	Corn, wheat	Peanut, cane, vegetable seeds	45
9	0.43	50	Rice, corn	Vegetables	0

Source: the fieldwork survey.
Note: 1 Chinese *mu* equals to 1/15 hectares.

Table 1.6 Non-farm enterprise type and quantity of the sampled villages

Villages	1	2	3	4	5	6	7	8	9
Construction and materials	1	2	4	4	7	n.a.	n.a.	n.a.	n.a.
Manufacture	n.a.	3	10	n.a.	1	2	n.a.	n.a.	65
Transport	15	45	75	120	64	40	n.a.	15	6
Garment	n.a.	1	3	28	4	n.a.	n.a.	n.a.	n.a.
Hotel	n.a.	n.a.	9	n.a.	3	n.a.	n.a.	n.a.	n.a.
Repair shop	1	2	n.a.	n.a.	5	1	2	n.a.	n.a.
Retail and catering	12	16	9	12	12	7	8	3	8
Other services	n.a.	n.a.	5	60	8	1	8	n.a.	n.a.
Grain processing	1	3	3	2	3	3	n.a.	3	n.a.

Source: the fieldwork survey.

Table 1.7 Annual incomes per capita of the sampled villages (calculated from the sampled households)

Village	Per capita income (Chinese yuan)	Proportion of labour in farming (%)	No. of household owned OAEs	Proportion of labour in OAEs	Proportion of labour in OFAs & migration	Per capita income (AHs) (Chinese yuan)	Per capita income (DHs) (Chinese yuan)	Per capita income (NAHs-NAEHs) (Chinese yuan)
2	5,421	43.5	16	21.8	34.8	3,013	5,080	9,958
5	4,389	64.8	14	25.3	9.9	2,905	4,095	8,221
4	3,714	60.3	16	25	14.6	2,234	3,279	8,200
9	2,516	56.9	14	23.9	19.4	1,401	3,099	4,030
7	1,443	86.3	3	3.5	10.3	1,107	2,309	
3	1,217	87.6	5	8.6	3.8	971	3,224	1,233
1	1,017	76.4	5	10.9	12.7	306	2,405	5,133
6	483	75.2	3	4.3	20.5	-151	1,360	
8	340	88.9	2	2.0	9.1	183	898	
Average	2,283	71.5		13.5	14.8	1,087	3,051	

Source: the fieldwork survey.

Table 1.8 The characteristics of the sampled households of each village

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Village	Valid households	AHs	DHs (1)	DHs (2)	Overlap of (4) & (5)	Overlap of (8) & (9)	NAHs	NAEHs	Household with only farming employed jobs
1	50	37	6	4	1	0	3	1	0
2	50	13	17	10	1	0	7	4	0
3	49	39	3	2	0	0	3	0	2
4	48	21	9	10	1	0	7	2	0
5	49	26	6	7	1	0	8	3	0
6	50	29	19	3	1	0	0	0	0
7	50	36	11	3	0	0	0	0	0
8	50	39	9	2	0	0	0	0	0
9	48	19	15	8	1	1	5	3	0
Total	444	259	95	49	6	1	33	13	2

Source: the fieldwork survey.

Note:

1. AHs denotes households with only household farming which includes farming and husbandry;
2. DHs (1) denotes households with household farming activity and non-farm-employed jobs;
3. DHs (2) denotes households with household farming and household owned non-farm business;
4. NAHs denotes households with only household owned non-farming business;
5. NAEHs denotes households with only non-farming-employed jobs;

Chapter 2

EMPLOYMENT DIVERSIFICATION IN RURAL CHINA: DETERMINANTS AND CONSEQUENCES

2.1 Introduction

The abolition of collective agriculture in China in the late 1970s, and the relaxation – but by no means the abolition - of the constraining household registration system (*hukou*), has permitted rural households and individuals to take their own decisions about choice of livelihood. Although subsistence farming, with its peasant mode of life, continues to dominate the countryside, a whole array of off-farm activities (OFAs) has emerged. These offer the prospect of employment diversification and of enhanced earnings potential. Of course there is a price to pay for the new opportunities, and for those worried about equity, there is indeed mounting evidence of significant social and spatial differentiation emerging, not only between provinces, counties and townships, but even extending down to villages lying within close proximity of each other (Knight & Li, 1997).

The context of these important national developments is clear enough. Long ago, Arthur Lewis (1954) argued that during the normal transition process, developing countries were characterised by having "unlimited" supplies of labour in the traditional sector. Half a century later, with population having expanded enormously, and with the institutional barriers to inter-sectoral migration progressively reduced, China finds herself in the

position of possessing about half a billion rural workers (State Statistical Bureau, 2000). It is estimated that agriculture itself can productively absorb, at best, only half of this huge number. Internal migration to the towns and cities is obviously one solution to "surplus" person-power, but there are several practical obstacles standing in the way, not least the fact that many of the urban sprawls are already close to, or even beyond, the limit of their sustainability and effective carrying-capacity. Furthermore, due to poor information and the weak state of communication links, rural labour markets – not just in China – are, in many respects, both incomplete and imperfect so that even substantial differences in comparative levels of productivity, may not always have the desired effect of inducing farmers to leave land-intensive agricultural pursuits. Therefore, in a liberalising environment, establishing rural OFAs not only becomes a matter of responding to market signals, but is also a stratagem for survival and a means of elevating the marginal product of worker left behind (Lewis, 1954). Recent research confirms that returns to labour in OFAs are much higher than in farming (Knight & Song, 1997; Song, 2000).

With respect to the determination of the actual destination of off-farm employment, the literature points to a variety of forces at work. For those studies using rural surveys conducted prior to the mid-1990s, non-market variables occupy a prominent place (Cook, 1998; Sato, 1998; Parish *et al.*, 1995). Based upon a survey of seven villages in Hebei Province, Knight and Li (1997) identified a whole raft of forces including location, natural resources, transportation, access to cities, and accumulation of local skills. However, given the rapidity of the transition, it seems likely that some of the influences will steadily erode. For example, since 1995, the government has altered its stance on the ownership of rural enterprises. Most TVEs (township and village enterprises) have now been privatised (Oi, 1999; Fong, 1999; Rozelle, Huang & Zhang, 2002), and this would tend to lessen the degree of overt political considerations at work. Moreover, as a consequence of the

massive retrenchment of workers by many SOEs (state-owned enterprises), considerable pressure has been placed upon employment levels throughout urban areas across the whole country (Appleton *et al.*, 2001). Migrants thus encounter more competition for jobs. At the same time, the imperative of finding off-farm sources of employment has intensified in the countryside. This is partly because of the stagnation of agriculture; in fact, the sector has not experienced much recent growth after the dramatic success in raising grain production immediately following on from the 1978 reform (Oi, 1999). In addition, many local governments now levy punitive – and notoriously arbitrary - taxes and "fees" upon both rural enterprises and individual residents. Another worrying trend is that after a period of explosive growth, over the last few years, rural off-farm enterprises have entered a phase of consolidation and even begun to experience recession (Oi, 1999; Zhao & Wong, 2002).

It may be inferred then, that market – rather than political - factors are of rising importance in allocating private off-farm employment among rural residents, and hence in determining their earning capacity from such activities. The aim of this chapter is to provide some solid empirical evidence in support of this contention. In order to simplify our task we have adopted what has now become something of a conventional typology, but with one addition. Following the work of Knight and Song (1997) and Cook (1998), a three-fold division of economically-active rural participants was established: wageworkers in off-farm jobs; those who are self-employed in own-account, off-farm enterprises (OAEs); and out-migrants. We then realised that it would not be wise to exclude a fourth category of work i.e., wage workers engaged in farming on land in the possession of other households (in effect, part-time agricultural labourers), and probably it is the first attempt to disclose the labour prices and determinants of earnings of waged farming jobs during agricultural peak time in the Chinese context.[15] In practice, this latter category tends to be

[15] To my knowledge, there hasn't been any published study about Chinese agricultural peak time labour.

of an essentially temporary, casual and supplementary nature and chiefly arises at peak agricultural seasons; the great majority of such inhabitants are already normally involved in household farming. As we would expect then, comparison of earnings and earnings functions for these farming waged workers with household farming and other OFA categories will reveal some vital clues of labour prices of agricultural peak time in the Chinese context, of whether human capital of those farming waged workers are rewarded differently from other OFA categories. As far as financial remuneration is concerned, we are able to deploy a standard earnings function approach for all but those running OAEs. Clearly, given the circumstances of rural OAEs, the self-employed invariably interact with other household members, and their conduct is therefore the outcome of family, rather than just individual, deliberation. This suggests that a production function approach be used for this group of respondents. The structure of the paper follows this logic. In Section 2.2, our data set is outlined. Section 2.3 presents our methodology. Sections 2.4 and 2.5 discus the findings of the econometric analysis, and Section 2.6 contains our conclusions.

2.2 The fieldwork data

As we have given in Chapter 1 a detailed description of the fieldwork – a survey of 450 rural households conducted by the author in a clustering of nine villages scattered across Xinmin County of Liaoning Province of the northeast China in 1998, here only the relevant specification and variables are to be presented.

Table 2.1 and, in derivative summary form, Tables 2.1A, 2.1B and 2.1C, presents the relevant data. Altogether 450 rural households were surveyed, and this yielded information on 949 rural workers. A detailed Questionnaire was administered seeking information about the material circumstances of the household as a unit, and then of individual

members. The initial classification reveals that 675 (71%) were engaged in household farming; 97 (10.2%) in OFAs as wageworkers; 134 (14%) in OAEs through self-employment; and 43 (just 4.5%) had migrated out of their home village. In addition, we learnt that 66 rural workers found some (part-time) employment on farms run by other households. To avoid any suggestion of double counting, in Table 2.1A we identify these workers in a separate column; the vast majority, 60, were, not surprisingly, drawn from the ranks of household farmers, with the remaining 6 from the wageworkers in the OFAs. The mean number of working days per year put in by these 66 persons was only 47, and just seven worked for more than 100 days. This confirms the seasonal and part-time nature of these jobs, and the fact that unlike other peasant-based societies that have long been exposed to the penetration of capitalist relations, such as India, in the PRC they are in their infancy.

It might also be helpful if we indicate the sort of OFA wage-work undertaken: 25 (of the 97) returned were engaged in public sector jobs including political cadres and schoolteachers; 27 were involved in collectively-owned TVEs; and the remaining 45 were employees of privately-owned OFAs such as plastic fabrication factories, and food processing units.

To demonstrate the extent of occupational diversification among the 231 OFA and OAE groups, we identified their continued involvement with household farming (Table 2.1B). We found that 69 of OFA wage workers (71%), and 59 of those in OAEs (44%) remained partially engaged with their household farming chores. The range of OFAs was quite wide and included cycle repair shops, the manufacture of spare parts for agricultural implements and machines, hairdressers, street vendors, and a miscellany of shop proprietors.

Before we proceed to specify our model, it may be helpful to provide a brief sketch of three salient characteristics of the sampled households. As far as their educational attainments are concerned, out-migrants possessed an average of 8.05 years, compared with 7.73 for OFA wageworkers, 7.27 for those operating OAEs and only 6.73 for household farmers. Predictably, individuals holding down public jobs had the greatest educational attainment (9.04 years). Second, and equally predictably, with respect to the average number of working days (in 1997), out-migrants put in the highest number at 272, followed by those in OAEs at 249, and wage workers in OFAs at 226, with farmers trailing at only 206 – so revealing the extent of underemployment on the land. Naturally there were substantial differences between those households that had diversified into OFAs and those that had not (Table 2.1C). Finally, just under half of those holding public office, and around one in five of all wageworkers in OFAs were members of the CP, whereas only a tiny percentage of all others held party membership.

2.3 Econometric Specification

2.3.1 Modelling the allocation of OFAs among rural workers

The probability of a rural worker engaging in an OFA may be estimated by using a multinomial logit model. We were compelled to exclude from the exercise the (66) wageworkers engaged in agriculture given the part-time nature of these jobs, and in any event most were captured elsewhere in the household-farming group. Aside from these, according to the classification schema outlined above in Section 2.1, and taking our cue

from the existing literature (Knight & Song, 1997; Cook, 1998)[16], we assume that choice of activity is the result of stochastic utility maximizing behaviour. Let U_{HHF} denote the utility derived from household farming; U_{OFA} the utility from wage work in OFAs; U_{OAE} the utility from OAEs; and U_M the utility from out-migration. Then, rural workers would choose:

(1) Household farming if $U_{HHF} > U_{OFA}$, U_{OAE} and U_M;

(2) OFAs if $U_{OFA} > U_{HHF}$, U_{OAE} and U_M;

(3) OAEs if $U_{OAE} > U_{HHF}$, U_{OFA} and U_M;

(4) Migration if $U_M > U_{HHF}$, U_{OFA} and U_{OAE}.

If it is further assumed that these utilities are functions of personal, household and location characteristics, then:

(1) $U_{ij} = \gamma_{ij}' W_i + \eta_{ij}$

where j is the choice of activities of the rural workers, γ denotes a vector of regression coefficients, W denotes the vector of explanatory variables, and η is an error term. Further, the distribution of probabilities of choice of activities can be computed by:

(2) $$probability(y = j) = \frac{e^{\gamma' W_{ij}}}{1 + \sum_{k=1}^{J} e^{\gamma' W_{ij}}}$$

where $j = 0, 1, 2, \ldots, J$. (Greene, 1997(a): 915)

In rural China, arable land has been distributed on a generally equitable basis between cultivating households according to either the number of members or the number

[16] Previous studies such as Knight and Song (1997) and Cook (1998) employed the multinomial logit model analysing the determinants of the allocation process of farming, local non-farm, and out-migrating opportunities between Chinese rural workers or households. Obviously, one reason that I adopted this particular model is just taking a cue from the existing literature. The other reason for this is that the multinomial probit model is very demanding in term of computation, whereas semi or non-parametric methods more or less aim at modelling binary choices rather than multiple choices.

of farmers registered in each village. In principle, therefore, all householders can work on their plot, so that farming occupies a fallback position. For this reason, we set household farming as the default option in the model.

The independent variables include the individual and household characteristics of the rural workers and location effects (Table 2.1). Being a member of the party and having a township or village leader in the household will be used as convenient surrogates for "non-market" or political influences. For human capital, as related to market forces, we used fairly standard variables namely, "experience" (defined as potential working years after completion of full time education), "experience squared", "education" – as measured by years of schooling, "possessing trained agricultural skills" and "possessing non-agricultural skills".

We chose "gender", "marital status" and the variables identified under household characteristics, inclusive of the "number of workers in the household" and the "dependency ratio" as representing an array of social factors. However, the role of "arable land per worker", when considered as a household variable, might well be endogenous. This is because although a household's parcel of land still cannot be sold outright, it may certainly be either leased out or rented in. A household with a member engaged in an off-farm pursuit could opt to lease out all or part of the holding; while, equally, a household whose members cannot manage to obtain work off-farm could rent in land to enhance its income generating activities. During the course of the fieldwork several village leaders reported that their respective community committees had leased out collectively owned land in order to obtain additional sources of revenue (to cover various administrative expenses). Moreover the land in the possession of a rural household we defined in terms of the acreage actually planted and cultivated. The practical implication of this decision was that the amount of land cultivated by a rural household was adjudged equal to the holding

sanctioned by local regulation, minus the quantity leased out, but plus the quantity rented in. This definition would thus suggest that the quantity of arable land per worker depended upon whether - or to what extent - a household member worked off-farm. For this reason, the "arable land per worker" variable was excluded from the particular regressions.

In theory, location dummy variables (by village) should be able to capture a spectrum of factors.[17] This is because, for peasant societies all around the world - not just China, the village functions as a distinctive, focal unit almost from the cradle to the grave. Socially, kinship, trust, marriage, work and much else revolve around the rhythm and routines of village life. Land, natural resources, access to information and traditional cultural assets are part of a single fabric. Similarly, distance to nearby market towns or urban areas, especially in terms of transportation and communications links, clearly exert a profound effect upon the potential level of development through off-farm opportunities and, not least, out-migration. As Knight and Li (1997) have argued, following on from Gunnar Myrdal's original insight, once a virtuous cycle of cumulative causation commences, the degree of OFA and OAE involvement in a village, probably combined with the ebb and flow of migration, enhances the capacity of households to create new off-farm jobs, and allow networking to occur. We also know that the physical size of a village has some importance for developmental prospects: the greater the population the more active is its off-farm capacity (Song, 2000). Table 2.1 provides some basic details of the distribution of employment in each of the sample villages. For the relatively better-off villages i.e., Numbers 2, 4, 5 and 9, the proportion of the work force involved with household farming is in the range of 44-65%; and between 12-16% of work is in OAEs. This is in contrast to

[17] Variables like transportation conditions, distances to township or nearby cities, size of a village, development level of non-farm activities, number of out-migrants, etc., all can be used to proximate characteristics of the sampled villages. However, no matter how many these variables are specified in an econometric regression, people still point out more of these kinds of variables. Arguably, these variables are non-exhaustive, whereas the number of observations are limited and some of these variables might be correlated. After weighing and pondering, I simply chose the village dummy variables to control the location factors.

the "middle-range" group of villages 3 & 7, and the poorer group, 1, 6 & 8 whose share of household farming is never below 75% and ranges as high as 87%, with only a very small or even zero shares of OAEs. These figures obviously suggest that the establishment of an OAE sector is an important step on the road to rural development.

2.3.2 The earnings and production functions

As the process determining earnings for those engaged in waged work is not the same as that determining earnings for those in OAEs, our modelling procedure needs to reflect this difference.

The earnings function. For wageworkers the semi-logarithmic form of an earnings function is used:

(3) $LnW_i = \beta_k X_i + \varepsilon_i$

where W_i is daily wage or earnings, X denotes a vector of explanatory variables, β a vector of coefficients, and ε is an error term.

The dependent variable is the log of daily earnings (see Table 2.1 for results in summary form). In our study, the OAEs generated the highest mean daily earnings, 38.39 yuans. The out-migrants stood in second position with 30.84 yuans. We found it somewhat surprising that wage labour in agriculture was as high as 27.24 yuans but, upon reflection, this is explicable in so far as it denotes a return to peak periods when labour time is scarce. The mean earnings of household farmers were the lowest of this group at just 11.83 yuans - and that was before deductions for tax and fees. For those wage workers engaged in OFAs

the mean earnings amounted to 18.69 yuans or only 6.86 yuans higher than that for household farming. There were, of course, differences within the broad OFA category (Table 2.5.2): public sector jobs paid the most at 21.89 yuans, and TVE work secured the lowest at 14.78 yuans.

The earnings functions for OFAs, out-migrants and casual farm workers were estimated in Mincerian form, i.e., the explanatory variables of the log of earnings were years of schooling, experience and its quadratic term (Mincer, 1974). Experience is defined as potential working years since the completion of full time education. In addition, sex and location dummy variables are also included. This restricted form of the earnings function is, arguably, of more use in capturing the full effects of human capital (Appleton *et al.*, 2000). In the full specification, apart from education and experience, each separate function possesses its own specific variables to proxy for human capital. For employment in OFAs and for the out-migrants, the additional variables are non-agricultural skills and party membership.

The production function. For analysing the determinants of income in OAEs, household production functions were estimated. As, at the outset, it was unknown whether a Cobb–Douglas model would be appropriate or not, the function was estimated by using the Translog model (Berndt & Christensen, 1973; Jacoby, 1992; Appleton & Balihuta, 1996; Song, 2000). Then, an F-test or Likelihood Ratio test could be used to test the null hypothesis of the Cobb-Douglas model. A main drawback of Cobb-Douglas model is that it imposes strong separability between different production factors. In contrast, the Translog production function imposes no separability restrictions; in other words, it allows flexibility in the effects of the factors of production. Besides, Translog function has both

linear and quadratic terms with an arbitrary number of inputs, therefore, it can be reduced to the multiple inputs Cobb-Douglas function as a special case.

The Cobb-Douglas production function is stated as:

$$(4)\ \ln Y = \beta_0 + \beta_L \ln L + \beta_K \ln K + \beta_i X_i + \varepsilon_i$$

where Y is the value-added income from OAEs[18]; L is the labour input to OAEs; K the capital; and X represents the other relevant variables including education of the head of household in school years, the experience of the household head, household head experience squared, and location. This is the restricted form. In the full specification, variables capturing non-agricultural skills and party membership are also included.

The Translog production is as follows:

$$(5)\ \ln Y = \beta_0 + \sum_{k=1}^{K} \beta_k \ln X_k + \frac{1}{2} \sum_{k=1}^{K} \sum_{l=1}^{L} \gamma_{kl} \ln X_k \ln X_l + \varepsilon$$

where X is a vector of production factors (labour and capital). Due to the existence of second order terms, the coefficients of log linear terms are difficult to interpret. This obstacle can be overcome by substituting ($\ln X_k - \ln \overline{X}$) for lnX_k, where $\overline{X}$ is the geometric mean of input X_k. This transformation means that β_k are just the production elasticities evaluated at means of explanatory variables because all the second order terms vanish as at that point (Jacoby, 1992). As in the Cobb-Douglas function, other variables, including human capital and location may be added, but only in a non-logarithm form.

2.3.3 Sample selection

[18] When designing the questionnaire and conducting the fieldwork, I ask the households with non-agricultural own account enterprises (OAEs) to report their net income from their from OAE activities after deducting expenditure on all sorts of input and wages to hired workers, but not their own income or wages because it is hard to estimate their own income or wages. Therefore, the value-added income ought to be the net income from OAE production inclusive of own labours' earnings or wages.

As we have shown, in general, earnings from OFAs, and especially OAEs, and those from out-migration, are much higher than in household farming. However, not every village inhabitant of working age can – or indeed desires - to enter the non-agricultural labour market. Clearly there is an element of self-selection involved rather than just random choice. It might be reasonably expected that rural workers opting for OFA wage employment, running an OAE, or out-migrating would be receptive to new incentives, be endowed with some particular talent for establishing a business or be prepared to expose themselves to more risk. Under such circumstances, *ceteris paribus*, the unobserved determinants of earnings (the error terms in the earnings equation) should be greater than those for the rural dwellers who decide to remain with the traditional pursuit of tillage. Unless we control for this effect, our results may imply rather unrealistically high earnings for a random member of the rural work force. The unobserved determinants of earnings might well be correlated with the unobserved determinants of the activity selected. If such unobservable determinants are also correlated with some independent variables in the earning equation, a bias could creep into the estimated coefficients (Appleton, *et al.*, 1999).

As there are more than two choices available to the rural population in our specification, the Heckman sample selection cannot be deployed here. Instead, Lee's (1983) two-stage sample selection procedure was selected. In the first stage, the choice of activities was based upon a multinomial logit model. The number of workers in each household and the dependency ratio (the ratio of dependants to the number of workers in each household) can be identified as instrumental variables. The reason for this is simply that these two variables can, at least to some certain extent, determine what kind of off-farm activities is chosen, but they should not affect earning capacity directly. In the second stage of the model, the probabilities P_{ij} that an individual i being in an activity j predicted

by the multinomial logit are used to construct Mill's inverse ratios, λ_{ij}. The earnings function corrected by sample selection would then be:

(6) $LnW_{ij} = \beta_j' X_{ij} - \sigma\rho_j \lambda_{ij} + v_{ij}$

where $\lambda_{ij} = \phi(h_{ij})/\Phi(h_{ij})$ and $h_{ij} = \Phi^{-1}(p_{ij})$, $\varphi(\cdot)$ and $\Phi(\cdot)$ are the density and cumulative distribution functions of the standard normal distribution respectively, and v is an error term (Appleton *et al.*, 1999).

These sample correction procedures are not appropriate for those engaged in OAEs as, we have already argued, self-employment is more reflective of household rather than individual choice. Therefore, the first step of sample correction is to model the kind of activities that these households are occupied with. We again divide our sample rural households into the three categories, pure farming households, households with their member engaged in OFAs, and households running OAEs. We also deploy the same explanatory variables as selected earlier. In addition, we also identify the number of workers in each household and the dependency ratio as instrument variables. In our second stage, the probabilities P_{ij} that a household i being in an activity j predicted by the multinomial logit are used to construct Mill's inverse ratios, λ_{ij}. Then the sample correction variable λ_{ij} is placed in the production function for a household's OAE. It should be noted that the multinomial logit estimation results for the rural households' choice of income generating activities are not presented here because our emphasis is upon individual - rather than household - behaviour.

When trying to control for sample selectivity in estimating the earnings functions for local waged OFAs and rural-urban migrants, it is necessary to conduct several tests for the

validity of our instruments for the selection correction. According to a likelihood ratio test, our two proposed instruments for selectivity are significant in the multinomial logit – the first step for the sample correction. However, at the 5% significance level they did not pass a Chi-squared over-identification test for whether it is valid to exclude the instruments from the earnings function for migrants.[19] The tests indicate that the instrumental variables proposed for correcting sample selection are not valid. Consequently, the sample selectivity corrected earnings functions cannot be used in the final results.

Regarding the production function for OAEs, a likelihood ratio test indicated that the two instruments for selectivity are significant in the first step of the sample selection procedure and also passed the Chi-squared over-identification test at the 5% significance level. This implies that the sample selectivity correcting procedure for the production function for OAEs is valid. Therefore, the sample corrected production function for OAEs ought to be used in the final results. In the multinomial logit estimation of the choice of income generating activity, the first stage of the sample selection model, both the instrument variables i.e., the number of workers in each household and the household's dependency ratio, are significant at the 1% level, and possess a positive sign. The correction for the selectivity variable in the production function is significant at the 5% level and has a positive sign. This suggests that there are positive correlations between the unobserved factors that determine which households engage in OAEs and the determination of their earnings.

2.4 The results of the multinomial logit estimation for the allocation of off-farm work

[19] The test is described in Deaton (1997: 112).

Model Description. The results of the multinomial logit model include the coefficients of the independent variables (Table 2.2.1); their marginal effects (Table 2.2.2); and predicted probabilities evaluated at various values of the dummy independent variables (Table 2.2.3). For the dummy variables, the effects upon the workers' choice of activities are assessed by the predicted probabilities estimated at the means of the other explanatory variables - since the marginal effects may be misleading (Greene, 1997(a): 878; Appleton et al, 2002: 261). For the continuous variables - such as experience and education - the marginal effects are informative. Overall, the goodness of fit of the model as measured by the likelihood ratio is 0.21 or 79% as measured by the percentage of correct predictions. The base probabilities for the rural workers' choice of activities at the mean of the explanatory variables are 80.2% for household farming, 7.2% for wage work in OFAs, 11.3% for those in OAEs and 1.4% for out-migrants.

The Effect of Political Factors. The variables representing "non-market", or what might be fairly described as political factors, include "being a party member", and "having a village or township leader in the household". It is clear that, as expected, the former helps rural dwellers to secure waged employment in OFAs. A majority of the 97 OFAs were either in the public sector or in collectively owned TVEs. Equally logically given the private enterprise nature of OAEs, party membership does not seem to be important in terms of self-employment. This seems to be the case for two specific reasons. First, if the OAE were only of a very small-scale or petty capitalist type, then it would tend to be less remunerative than a public sector post. Second, if the OAE was of a more substantial nature, then a degree of entrepreneurial aptitude might be necessary for success, and this would not be related to political affiliation *per se*. As far as the predicted probabilities are concerned, party members have a higher probability (24.31%) of securing employment in

the off-farm sector than those who are not members - whose probability is only 6.78% (Table 2.2.3). The effect of "having a village or township leader in the household" is nearly same as that of party membership except that its probability to secure a waged job is a little lower (21.80%). Migration may also be out of local institutional and political control. We may therefore conclude that although political factors still help rural workers to secure local public sector jobs, market forces are now of considerable importance in allocating private off-farm employment among rural dwellers. From Table 2.1 it may be observed that as the mean of OFA earnings is well below that of both OAEs and out-migration, there would be a social as well as a private gain if labour resources were to be shifted to OAEs and migration. This result is consistent with the previous studies such as Knight and Song (1997) and Song (2000).

The Effects of Market Factors. In this research, human capital (and by extension market forces) comprises the variables "school years", "experience", "experience squared", "possessing agricultural skills" and "possessing non-agricultural skills".

We may see from Table 2.2.1 that experience and experience-squared are both insignificant in allocating off-farm work among our sample of rural dwellers. The most likely explanation is that most inhabitants possess a basic level of common experience (perhaps acquired from household farming), and that this is not particularly appropriate for OFAs or indeed for OAEs.

An important aspect of human capital endowment is obviously education. Our results (Table 2.2.2) reveal that the marginal effects of the number of school years are significant in terms of household farming, wage work in OFA jobs and out-migration - but not upon OAEs. This latter result is not especially surprising in the light of our knowledge of entrepreneurial traits elsewhere. An additional year's education enhances the possibility

of obtaining a wage job by 1.3%, and raises the prospect of out-migration by 0.5%. In contrast, and in general consonance with experience all over the developing world, an extra year of education would lower the probability of working in household farming – in this instance by 2.1%.

In our context, the most practical and tangible dimension of human capital is skill (Table 2.2.3). In principle, the possession of non-agricultural skills might be expected to help rural workers go off farm. As anticipated, our results confirm this for wage work in OFAs, also for those in pursuance of OAEs and for out-migrants. One rather anomalous finding is that the possession of agricultural skills actually reduces the probability of a village inhabitant of working age engaging in household farming – though it does assist in obtaining wage work in OFAs. We can only speculate that, on the one hand, additional farming skills may have little relevance for household cultivation; and, on the other, that those rural workers with agricultural skills may be more motivated than others and hence be more inclined to seek off-farm employment.

The Effects of Social Factors. We next consider those variables that are social in character. We begin with the combined gender and marital status variables, "male single", "female single", "married male" and "married female". The last named has been chosen as the default in order to avoid dummy variable trap. It was discovered that the predicted probabilities suggest that being single and male elevates, significantly, the probability of obtaining off-farm employment compared to married female respondents (Table 2.2.3).

With regard to household characteristics, the "number of household workers" variable exerts a significant effect upon OAEs. An extra worker at home would raise the probability of establishing and running an OAE by 3.2%. This result is in keeping with experience elsewhere, and is not unexpected on logical grounds given the labour-intensive

nature of most off-farm enterprises in China. The other household variable highlighted, the "dependency ratio", also has a very significant effect upon OAE work (an increase by one unit of the ratio induces a rise of 7% possibility of pursuing OAE), as well as upon the more directly obvious household farming activity (a fall of 7.1%). Low income and underemployment in household farming (reported in Table 2.1), and especially the acute barriers of securing the scarce OFA opportunities are now conspiring to push rural dwellers with surplus labour and heavy life burden into OAEs.

The influence of the dependency ratio upon migration however, although positive and in the expected direction, is comparatively slight (1%). The reason is almost certainly associated with the effective limits of local networking in that although there may well be pressure to find work in the towns and cities, village cadres may not know (at all or so well) contacts further afield.

Location Effects. We can see from Table 2. 1 that none of the sampled inhabitants of villages 3 and 8 have migrated, so these two (village) dummy variables have been omitted from the rest of the analysis. Village 7 was selected as the default. This particular village, as we have noted above, has secured a county-level reputation for cash crop production, but it is situated far from any sizeable town or the provincial capital, and it generally lacks convenient transport and communication links. Because of these location factors, its OFAs remain in an undeveloped condition. For the other three activities, viz. household farming, OFA employment and OAEs the default villages are 3, 7 and 8. The two former units have earlier been ascribed "middle-income" status as a consequence of their agricultural pursuits; and village 8 is the poorest in the sample, and is almost entirely dependent upon farming. Compared to the three default farming-oriented villages, the

workers in the four comparatively richer villages 2, 4, 5 and 9, are less likely to be farmers, and more inclined to pursue OAEs.

In further contrast to the default units, workers in both the richer villages 2 & 9, and in the poorer village 6 have a higher probability of securing off-farm wage employment. In the case of the two former villages this is attributable to the job-generative OAEs located there; whereas village 6 possesses relatively developed collectively owned TVEs. Regarding out-migration, for quite different reasons associated with "pull" and "push" factors, the inhabitants of the richer villages 2 & 4, and of the poorer 1 & 6 exhibit the greatest propensities to seek employment elsewhere.

To conclude, location plays a very important role in determining the destination of employment for our sample of rural workers. Close proximity to a big city (relevant for villages 2, 4 & 5); being in the vicinity of good highway communications (villages 2 and 4); occupying a township seat (villages 4 and 5); possessing industrial capacity (village 9); and having the inherited advantage of collective OFAs (village 6), all turn out to be of considerable significance.

Apart from using village dummies to control location effects, we also conduct an exercise by employing village-level proximity factors to control location effects. These village-level proximity factors are distance to the provincial capital city, distance to the nearby highway, located at the township seat, possessing industrial capacity, having advantage of collective non-farm enterprises. The estimated results are reported in Appendix Tables 2.1 and 2.2. When comparing Appendix Table 2.1 to Table 2.2.1, we find out that the pseudo-R squared statistic (0.19) decreased a bit in Appendix Table 2.1; all major coefficients and their significance levels do not change significantly; the predicted results of the allocation of non-farm opportunities between rural workers do not change significantly either; finally, even the base probabilities for the rural workers' choice of

activities at the mean of the explanatory variables are basically kept a original level.[20] Two Likelihood Ratio tests were also conducted to test the significance of location effects. In both the cases of village dummies and village-level proximity factors, the test results are far bigger than the critical values of Chi-squared statistics. This suggests that including the location effects is essential to the model. Therefore, it could be argued that using village-level proximity factors instead of village dummies haven't improved the estimated results.

However, the estimated results about these proximity factors did tell some interesting story (see Appendix Table 2.2). First, villages located at the township seat marginally help rural individuals set up and run OAEs. Second, villages possessing industrial capacity facilitate significantly encourage locals to go off farm, to get local waged OFAs and to set up OAEs. Finally, three variables - the distance to the provincial capital city, the distance to the nearby highway and villages having collective enterprises - are not significant at all statistically.

2.5 The econometric results for returns to labour of OFAs

2.5.1 Model description

In this section, the earnings functions of wageworkers in OFAs and those for out-migrants are estimated with and without sample selection. The functions are estimated in both full and restricted specification, with the latter stressed in this section. The production function for those running OAEs is also estimated. The econometric estimating results are presented in Tables 2.3, 2.4.1, 2.4.2, 2.4.3 & 2.4.4.

[20] The base probabilities for the rural workers' choice of activities at the mean of the explanatory variables are 79.5% for household farming, 7.7% for wage work in OFAs, 11.1% for those in OAEs and 1.7% for out-migrants. The original figures are 80.2% for household farming, 7.2% for wage work in OFAs, 11.3% for those in OAEs and 1.4% for out-migrants.

To determine whether any two earnings functions under the restricted specification could be pooled, structural tests (Chow tests) were conducted. The null hypothesis of the Chow tests is that the coefficients of two earning functions are similar or, that the two earning functions can be pooled. Of the three main functions we have estimated, i.e., for wage work in farming, for OFAs and out-migration, none actually exhibited heteroscedasticity on the Breusch-Pagan test. However, pooling of any other two (of the three) functions were all rejected by the Chow test (Table 2.3). These results suggest that the rural workers in our sample are rewarded differently according to the type of activity engaged in.

In addition to these functions, further sub-estimations were conducted for employment in both privately owned (45 in our sample) and collectively owned (27) TVEs, and for public sector jobs - for example, teachers and professional party cadres (25) (Table 2.4.4). The results of the pairwise Wald test[21] demonstrate that some of coefficients are significantly different at the 5% level between each pair of these three particular functions. It was thus necessary to explore these in greater detail. In fact, the results of the Chow test indicate that these earning functions may indeed be pooled.

The hypothesis of the production function for the OAEs in Cobb-Douglas form is rejected by the F-test at the 2% level of significance. Additionally, a LR test[22] was also conducted to test the null hypothesis of the Cobb-Douglas model. The Chi-squared statistic of the LR test is 15.58, whereas the critical value of the Chi-squared statistic with degrees of freedom of six are 12.59 at the 5% significance level and 16.81 at the 1% significance level. Therefore, the null hypothesis of the Cobb-Douglas model was rejected at the 5% significance level. Based on these two tests, the translog form was adopted. A further test

[21] $(\beta_1 - \beta_2)/(Var(\beta_1) + Var(\beta_2)) \sim \chi^2(1)$, where ß$_1$ and ß$_2$ are coefficients of the same explanatory variable estimated in different earnings functions.

[22] For detail, see Greene (1997(a): 161-162).

on the validity of the production function concerns the question of whether any endogeneity may have crept in. For this production function, the most dubious variable was the annual labour input by the household expressed by the number working days. To detect this problem, an instrumental variable model (*IV* model) was used. In order to derive the predicted household labour input, demographic variables were used as instruments. These are the ratios of each of five age groups to the total number of household members. The groups are: 0 to 6 year-old; 7 to 10; 11 to 15; 16 to 60 female; and 61 and above; (the 16 to 60 male group was dropped to avoid perfect collinearity). Despite this allowance, an application of the F-test and the Hausman Test[23] cannot reject the null hypothesis that the labour inputs are not endogenous.

For the main three earnings equations (Table 2.4.1), the adjusted R-squared statistics was found to be in the range 0.32 - 0.45. For the OAE production function, the adjusted R-squared statistics was much higher at 0.73 but exhibited heteroscedasticity on the Breusch-Pagan test. So, the OLS production function coefficients are not effective. As a consequence, the earnings functions were estimated with the Feasible Generalised Least Squares (multiplicative heteroscedastic) model[24]; nevertheless this still proved to be unsuccessful. Under such circumstances, the only choice open to us was to use the White's heteroscedastic consistent standard errors in presenting the production function.

2.5.2 Explanatory variables

[23] This tests whether there is any endogenous problem. The null hypothesis is that there is no such endogeneity under which both b (the least square estimator) and b_{IV} (the *IV* estimator) are consistent estimators of β; however the former is an efficient estimator whereas the latter is not. However, if the null hypothesis is rejected, only the *IV* estimator is consistent. As the Hausman test, in this context, is simply the Wald test, the formula is: $W = (b_{iv} - b)'[V_{iv} - V](b_{iv} - b) \sim \chi^2[k]$, where $V = s^2(X'X)^{-1}$ is the estimated covariance matrix for the least square estimator, and *Viv* is the estimated asymptotic covariance matrix for the *IV* estimator (Greene, 1999: 383-387).

[24] We used the HREG command of the LIMDEP econometric software, modelling the error variance as the exponent of the vector of explanatory variables and associated coefficients.

As concluded in Section 2.3.3, the earnings functions for local waged OFAs and migrants without sample selection (Columns 3 and 4 in Table 2.4.1), and the sample corrected production function for OAEs (Column 3 in Table 2.4.2) should be used to interpret the final results here. The earnings and production functions are presented in Tables 2.4.1, 2.4.2 and 2.4.3.

Now the rest of this sub-section will be devoted to interpreting the explanatory variables. Measuring human capital is the most important task in estimating an earnings function. In the restricted specification, the variables proxy for these form of capital are education and experience. In the restricted specification, the variables that proxy for human capital are education and experience. In the fully specified form of the earnings and production functions, variables such as farming skill and non-farm skill can also proxy for human capital. Party membership is a surrogate for political influence. The earnings and production function of restricted form will be stressed.

For the wageworkers in agriculture, those engaged in OFAs and in OAEs, and for the out-migrants, education is the only significant for those migrating and those running OAEs. For the migrants, the Mincerian return to education is 30.3% in the restricted specification. Our reported rate for out-migrants is greater than that found by other researchers. Appleton *et al* (2001), using a large national data set for the Chinese urban labour market as a whole, found the return to education was of the order 7% for both rural-urban migrants and non-retrenched urban workers. One plausible explanation for these differences may be that our results for the out-migrants capture local rather than national trends. As regards educational investment for those in OAEs, the rate of return to the household head education is 12.6% (Column 3 in Table 2.4.2). Therefore, the returns to education in the earnings and production functions are quite different according to the category of off-farm activity undertaken. We have already reported that education seems to

act as a barrier to engaging in the pursuit of OAEs. However, once rural inhabitants manage to obtain a foothold in an OAE, education does then yield significant returns. Education is also helpful in securing wage employment in OFAs, but thereafter did not raise the earnings threshold.[25] Education is of considerable importance for the out-migrants too.

As far as experience is concerned, and with the focus still on the restricted specification form, with the exception of those in OAEs, the variable is statistically significant for all other OFAs and migration. The earnings of the three OFAs had an inverse-U relationship with potential experience, peaking at 24 years of experience for the farming wageworkers; 36 years for OFA waged workers; and 27.5 years for migrants.[26]

After human capital, the next point of attention is gender. In our sample, the sex of the respondent appears to be of significance only for wageworkers in OFAs, and it also favours males - in view of the ingrained prejudices still very much alive in most places in rural China.[27] For those in wage work in farming and for the sample of out-migrants, gender does not seem to be of much importance; both results are comprehendible.

In addition to education, experience and gender, the other aspects of human capital such as the possession of farming and non-farming skills, and political factors - such as party membership - are included in the full specification form of the earnings and production functions. It is clear from the results that the acquisition of a complement of non-farming skills has significant positive effects upon the earnings of the migrants.

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[25] For the OFA sub-groupings the returns to education are only available in the full specification form of the earnings function. For those in the public sector the return is 10.8%. For wage workers in the TVEs the returns in our sample are actually negative (-12%). We can think of several plausible reasons for this rather odd result, all connected with the special (clientist) nature of hiring and retention in collectively owned enterprises (Table 2.4.4).

[26] For those employed in the OFA sub-groupings, the earnings also have an inverse U shaped relationship with potential experience, peaking at 33 years of experience for the public job holders, 27 years for the collectively-owned enterprise workers but the coefficients for the workers in private enterprises are not significant at all (Table 2.4.4).

[27] For the OFA sub-groupings, gender is only significant for jobs in the private sector. Gender seems to have no significant effect upon earning potential in public sector and TVE employment (Table 2.4.4).

Further, party members earn more than those who do not join, but only for those employed in OFAs.[28] Given the household structure of farming, it is not surprising that the possession of agricultural skills does not determine the level of earnings of farming wageworkers.

Overall, then, these results point to the gradual emergence of more competitive rural labour markets. On the one hand, education and experience does not turn out to be significant for all of the earnings and production functions that we have been able to estimate. But on the other hand, with the exception of public sector jobs and employment in the collectively owned TVEs, party membership does not seem to influence the earnings capacity of all the other participants in off-farm activities. We would therefore be inclined to argue that the evidence points to a period of transition underway: for the older categories of work, earnings are still affected by political considerations, but for the newer, the market is winning out.

2.5.3 Simulation from the earnings functions

In this section we investigate a series of counterfactual propositions. For this purpose, simulations from the earnings functions are deployed. Such simulations are only possible for wageworkers in agriculture, those engaged in OFAs and the out-migrants, as no earnings functions are available for either household farmers or those running OAEs. Wageworkers in farming have been chosen as an exemplifier of the method. The following equation sets out the simulation:

[28] Concerning the sub-groups composition of the OFAs, party members earn more in both the public sector and in collectively owned TVE jobs as anticipated; and membership exerts no influence upon private off-farm employment. The possession of non-agricultural skills does not affect the earnings of anyone in these sub-groupings (Table 2.4.4).

(7) $E(W_i) = \exp(\beta_j X_i + \frac{1}{2}\sigma_j^2)$ (for detailed discussion about this equation, please see Greene (1997(a): 71); and Appleton *et al.* (2001))

where we intend to simulate: how much Group ***i*** would earn if they were put in Group *j*'s position and paid as Group ***j***.

$E(W_i)$ stands for simulated daily earnings for Group ***i***;

β_j is the vector of coefficients from the earnings function for Group ***j***;

X_i is a vector of the means of the corresponding explanatory variables for Group ***i***;

σ_j is the standard error of the earnings function for Group ***j***.

Table 2.5.1 presents the results of the simulated mean earnings for wageworkers in OFAs and out-migrants. As we have mentioned above, wage work in agriculture is temporary, casual and secondary, and is only available at peak periods. So the relatively high daily earnings reported (27.24 yuans) reflects the labour price at agricultural peak times. Surprisingly, these peak-time farming waged workers would earn less if they were put in a position of either wage OFA or migration. For those in OFA waged work, migration would only be of marginal benefit. However, when we disaggregate this group into the three constituent elements, a slightly more complex picture emerges (Table 2.5.2). All three would not experience any gain by shifting within the OFA category. This implies that these respondents have indeed made a rational choice given their own circumstances. Not unexpectedly, for those who have actually migrated, changing to any other activity would certainly reduce their earnings. Although we do not have effective data for the two other categories, it is evident from the absolute figures presented in Table 2.5.1 that they occupy different ends of the earnings spectrum. Those in household farming are quite unambiguously worse off, and it therefore seems likely that even after adjustment is made

for their particular circumstances, a move to an OFA, or to take the decision to migrate would, *ceteris paribus*, enhance their potential earnings. The exact opposite holds for those running OAEs. Conclusively, except for those still staying on own farm, it seems that all of those managed off-farm, inclusive of the agricultural peak-time waged workers, could have reached their best earning capacity by exploiting their specific earning potential respectively.

2.6 Conclusion

On the basis of our case study of nine villages in northeast China, we have argued that there is mounting evidence that market - rather than political - forces are assuming an increasing role in the allocation of private off-farm employment opportunities. Education is proving to be a potent factor in assisting rural inhabitants to secure local off-farm waged jobs, and is a significant human-capital attribute for migrants. The possession of a complement of non-agricultural skills further encourages rural workers to gain off-farm jobs. The political factors that we have been able to identify and model - party membership or having a local government official in the household - still have a positive influence, helping rural dwellers to obtain some increasingly restricted types of local off-farm wage employment. However, they have little or no effect upon the establishment and functioning of OAEs, and nor do they influence the chances of migrants securing urban employment.

As far as the determination of earnings are concerned, once again we have assembled robust evidence to the effect that market forces are far more important than political factors, particularly in the fast growing private off-farm sector. The results of our earnings and production functions modelling procedure reveal that returns to education are significant for those running OAEs and those out-migrating. Further, the variable

"experience" has positive effects upon all the OFAs we have managed to capture in our survey.

Naturally, as China is at such a relatively early and still immature stage in regional and local economic development, there are many indications that the rural labour market is far from perfect in the neo-classical sense. We have demonstrated that a host of variables, broadly under the heading of "social" forces, continue to operate in the countryside. Gender, marital status and household demographic characteristics - such as the number of household members of working age, and the dependency ratio, all combine to exert a significant influence upon the allocation of household farming and off-farm activities. Certainly being male and single seems to strongly motivate rural inhabitants to strive for off-farm employment to a much greater extent than other household members.

Moreover, the accident of one's birthplace remains a potent determinant of work destination and earnings capacity and in this respect our findings are similar to those of research covering regions elsewhere in China (Travers, 1992). Compared to all the other factors we have considered, location continues to exert a powerful influence upon well-being. The distance from a village to either cities or even to one or other of the township administrative centres is still of great importance – as indeed is the ease of transport and communications. Both the initial conditions and natural endowments present in a village, as well as the industrial and commercial advantages built up over the last two decades, have a decisive influence upon the degree of job choice and the ensuing level of remuneration. As far as policy matters are concerned, this suggests that the uneven process of liberalisation of off-farm activities should be deepened and speeded up, and that more support and encouragement from all responsible components of the Chinese state would yield considerable private and social returns. In the wider sphere, a further re-allocation of

labour from household farming to the better-paid and competitive OFA sector would certainly help promote development in China and in other rural, peasant-based societies.

Table 2.1 The variables (and their mean values) used in the regression equations

	1	2	3	4	5
	Household farming	Wage work in farming	Wage work in OFAs	OAEs	Migrants
Number of observations (949 in total)	675	66	97	134	43
Average daily earnings (in Yuan)	11.83	27.24	18.42	38.39	30.84
Average number of working days p.a.	206	47	226	249	272
Individual characteristics					
Age of respondent	36.78	34.88	35.52	35.54	30.53
Male (%)	50.22	63.64	75.26	62.69	62.79
Marital status (%)	91.41	87.88	83.51	84.33	69.77
Education (in years)	6.73	6.44	7.73	7.27	8.05
Working experience (in years)	24.05	22.44	21.78	22.27	16.49
In possession of agricultural skills (%)	1.33	4.55	9.28	3.73	6.98
In possession of non-agricultural skills (%)	2.22	1.52	18.56	16.42	13.95
Party member %	2.52	3.03	18.56	3.73	2.33
Household characteristics					
Household size (persons)	3.54	3.52	3.63	3.91	3.81
Arable land per worker (in mu)	8.07	5.37	5.66	3.35	3.02
Number of workers	2.32	2.03	2.40	2.35	2.35
Number of dependants	1.22	1.48	1.23	1.56	1.47
Dependency ratio	0.597	0.849	0.577	0.820	0.754
Township or village leader in the household (%)	2.81	4.55	14.43	2.24	2.33
Village No. 1 (%)	12.44	16.67	2.06	8.96	27.91
Village No. 2 (%)	6.07	25.76	19.59	16.42	27.91
Village No. 3 (%)	13.19	9.09	5.15	7.46	0.00
Village No. 4 (%)	9.93	6.06	8.25	22.39	18.60
Village No. 5 (%)	8.59	13.64	9.29	16.42	2.33
Village No. 6 (%)	13.04	1.52	17.53	3.73	16.28
Village No.7 (%)	14.81	1.52	11.34	3.73	2.33
Village No.8 (%)	13.04	4.55	9.28	1.49	0.00
Village No.9 (%)	8.89	21.21	17.53	19.40	9.30

Source: Derived from our Fieldwork Survey.

Table 2.1A The distribution of the sampled rural workers by occupation

Occupation	Total Number of workers	Percentage of total workers	No. of workers farming for other households	The percentage of workers farming for other households
Household-Farmers	675	71.1	60	8.9
OFAs: Wage-workers	97	10.2	6	2.2
OAEs: Self-employed	134	14.1	0	0
Migrants	43	4.5	Not-applicable	Not-applicable
Total	949	100%	66	

Table 2.1B The number of OFA and OAE workers engaged on their own household farms

	The No. of workers engaged on their own household farms	The percentage of workers engaged in their own household farms
Wage- workers	69	71% (69/97*100)
Self- employed	59	44% (59/134*100)

Note: the numbers in the brackets are the standard deviations of the means.

Table 2.1C A comparison between the "diversified" and the "specialised" off-farm workers

	The "diversified" off-farm wage-workers	The "specialized" off-farm wage-workers	Those with "diversified" OAEs	Those with "specialised" OAEs
No. of observations	69	28	59	75
Average No. of off-farm working days p.a.	192.71 (102.40)	311.32 (64.65)	185.68 (100.82)	298.13 (84.14)
Average No. of working days on household farm	120.28 (82.67)		141.14 (100.94)	
Average daily earnings off-farm (in RMB Yuan)	20.08 (13.65)	14.35 (8.05)	38.76 (53.20)	38.10 (32.93)

Note: the numbers in the brackets are the standard deviations of the means.

Table 2.2.1 The application of the multinomial logit model (1): the value of the coefficients and their level of significance

	1	2	3
	OFAs	OAEs	Migration
Constant	-4.815	-4.476	-9.248
	(4.30)***	(4.65)***	(4.68)***
Male single	1.556	0.638	1.117
	(2.35)**	(1.15)	(1.32)
Female single	1.512	0.730	1.555
	(1.80)*	(1.07)	(1.67)*
Male married	0.959	0.396	0.353
	(3.21)***	(1.67)*	(0.81)
Experience	0.004	-0.031	-0.045
	(0.06)	(0.60)	(0.49)
Experience squared	0.000	0.000	0.000
	(0.09)	(0.36)	(0.15)
School years	0.201	0.058	0.373
	(2.50)***	(0.87)	(3.01)***
In possession of agricultural skills	1.403	0.781	1.383
	(2.39)**	(1.23)	(1.70)*
In possession of non-agricultural skills	1.854	2.045	1.786
	(4.53)***	(5.23)***	(3.03)***
Party membership	1.498	0.125	-0.187
	(3.04)***	(0.21)	(0.16)
Village or township leader in the household	1.317	-0.044	-0.777
	(2.44)***	(0.06)	(0.58)
Village 1	-1.579	0.895	4.289
	(1.95)**	(2.15)**	(3.99)***
Village 2	1.511	1.873	4.279
	(3.67)***	(4.68)***	(3.96)***
Village 4	0.392	2.116	3.916
	(0.83)	(5.91)***	(3.49)***
Village 5	0.589	1.756	2.054
	(1.28)	(4.57)***	(1.41)
Village 6	0.844	-0.186	3.511
	(2.23)**	(0.34)	(3.13)***
Village 9	1.211	1.915	3.298
	(3.15)***	(5.28)***	(2.82)***
No. of workers in each household	-0.076	0.311	0.039
	(0.51)	(2.64)***	(0.20)
Dependency ratio	-0.035	0.709	0.815
	(0.12)	(3.59)***	(2.49)***
Log-likelihood		**-666.9276**	
Restricted log-likelihood		**-846.5628**	
The Likelihood ratio index		**0.21**	
Number of observations		**949**	

	Predicted				
Actual	0	1	2	3	Total
0	649	10	14	2	675
1	67	19	11	0	97
2	98	4	30	2	134
3	30	5	3	5	43
Total	844	38	58	9	949

Source: Derived from our Fieldwork Survey.

Note: *** = Significant at the 1% level; ** = Significant at 5%; * = Significant at 10%. The t-ratios are in brackets.

Table 2.2.2 The application of the multinomial logit model (2): the marginal effects and their level of significance

	1	2	3	4
	Household farming	Wage work in OFAs	OAEs	Migration
Constant	0.783	-0.276	-0.395	-0.112
	(6.43)***	(3.72)***	(4.26)***	(3.08)***
Male single	-0.160	0.098	0.050	0.012
	(2.23)**	(2.26)**	(0.91)	(1.05)
Female single	-0.170	0.094	0.058	0.018
	(1.88)*	(1.71)*	(0.88)	(1.32)
Male married	-0.095	0.061	0.031	0.003
	(3.12)***	(3.15)***	(1.34)	(0.55)
Experience	0.003	0.001	-0.003	-0.001
	(0.46)	(0.13)	(0.60)	(0.45)
Experience squared	-0.00003	-0.00001	0.00003	0.000003
	(0.22)	(0.13)	(0.37)	(0.14)
School years	-0.021	0.013	0.004	0.005
	(2.39)**	(2.40)**	(0.55)	(2.11)**
In possession of agricultural skills	-0.167	0.086	0.065	0.016
	(2.05)**	(2.23)**	(1.05)	(1.37)
In possession of non-agricultural skills	-0.311	0.106	0.187	0.019
	(5.47)***	(3.66)***	(4.67)***	(1.84)*
Party membership	-0.096	0.099	0.001	-0.004
	(1.30)	(3.01)***	(0.01)	(0.27)
Village or township leader in the household	-0.064	0.089	-0.014	-0.012
	(0.78)	(2.54)***	(0.20)	(0.65)
Village 1	-0.036	-0.117	0.096	0.057
	(0.61)	(2.38)**	(2.36)**	(3.92)***
Village 2	-0.303	0.082	0.169	0.053
	(6.04)***	(2.99)***	(4.42)***	(3.75)***
Village 4	-0.257	0.005	0.203	0.049
	(5.51)***	(0.17)	(6.07)***	(3.73)***
Village 5	-0.215	0.023	0.168	0.024
	(4.34)***	(0.76)	(4.67)***	(1.39)
Village 6	-0.070	0.054	-0.031	0.046
	(1.22)	(2.17)**	(0.58)	(3.74)***
Village 9	-0.279	0.062	0.177	0.040
	(6.29)***	(2.45)***	(5.23)***	(3.22)***
No. of workers in each household	-0.024	-0.008	0.032	0.0001
	(1.56)	(0.79)	(2.73)***	(0.05)
Dependency ratio	-0.071	-0.009	0.070	0.010
	(2.51)***	(0.49)	(3.59)***	(1.81)*
Probabilities at the mean vector	**80.2**	**7.2**	**11.3**	**1.4**

Source: Derived from our Fieldwork Survey.

Note: *** = Significant at the 1% level; ** = Significant at 5%; *= Significant at 10%. The t-ratios are in brackets.

Table 2.2.3 The application of the multinomial logit model (3): Simulated Employment Probabilities of Individual Characteristics

	1	2	3	4
	Household farming	Wage work in OFAs	OAEs	Migration
Gender & marital status				
Male single	68.02**	15.46**	13.94	2.58
Female single	66.63*	14.49*	14.97	3.91
Male married	76.71***	9.59***	12.35	1.35
Female married	85.57	4.10	9.27	1.06
In possession of agricultural skills:				
"Yes"	58.23**	20.47**	17.53	3.78
"No"	80.61	6.97	11.11	1.31
In possession of non-agricultural skills:				
"Yes"	39.16***	19.95***	37.38***	3.52*
"No"	82.08	6.55	10.14	1.24
Party membership:				
"Yes"	64.53	24.31***	10.24	0.91
"No"	80.56	6.78	11.28	1.37
With a township or village leader in the household:				
"Yes"	68.41	21.80***	9.23	0.55
"No"	80.39	6.86	11.34	1.40
Village dummy variables				
Village 1	78.93	1.07**	11.06**	8.93***
Village 2	56.07***	16.75***	20.89***	6.29***
Village 4	60.59***	5.91	28.77***	4.72***
Village 5	68.39***	8.12	22.66***	0.83
Village 6	79.82	12.23**	3.79	4.15***
Village 9	60.55***	13.40***	23.51***	2.54***
Default village	88.91	5.86	5.09	0.14

Source: Derived from our Fieldwork Survey.

Note:

1. *** = Significant at the 1% level; **= Significant at 5%;*= Significant at 10%.
2. The t-ratios are in brackets. Villages 3 and 8 were omitted, as there were no recorded migrants.
3. Village 7 was defined as the default village for migration but for the remaining activities, the default villages were 3, 7 & 8.

Table 2.3 The Structural Test Results Between Different Earning Functions

	Wage work in agriculture	Wage work in OFAs	Migrants
Wage work in agriculture			
Wage work in OFAs	Chow test rejected at H_0 1%		
Migrants	Chow test rejected H_0 at 1%	Chow test rejected H_0 at 1%	

Note: H_0 denotes the null hypothesis.

Table 2.4.1 The Earnings Function (key variables)

	Without Selectivity Correction			With Selectivity Correction	
	1 Wage workers in agriculture	2 Wage workers in OFAs	3 Migrants	4 Wage workers in OFAs	5 Migrants
Constant	2.75 (8.09)***	1.865 (6.40)***	-0.117 (0.18)	2.680 (6.43)***	0.880 (0.94)
Male	0.100 (0.92)	0.251 (1.92)*	-0.213 (1.11)	0.164 (1.39)	-0.234 (1.29)
Education (in years)	0.018 (0.61)	0.031 (1.29)	0.303 (4.93)***	-0.015 (0.48)	0.257 (3.83)***
Experience	0.048 (2.59)***	0.071 (3.23)***	0.110 (2.46)**	0.072 (4.35)***	0.102 (2.38)**
Experience squared	-0.001 (2.19)**	-0.001 (2.66)***	-0.002 (1.30)	-0.001 (3.88)***	-0.001 (0.99)
Village 1	-0.04 (0.22)	0.594 (1.45)	-0.389 (1.66)	0.753 (2.23)**	-0.540 (2.32)**
Village 3	-0.80 (5.30)***	0.105 (0.40)		0.065 (0.27)	
Village 4	-0.33 (1.41)	-0.381 (1.82)*	-0.685 (2.48)**	-0.174 (0.83)	-0.706 (2.57)***
Village 5	-0.14 (0.91)	-0.422 (2.57)***	-0.413 (0.93)	-0.264 (1.36)	-0.261 (0.41)
Village 6	-0.25 (1.94)*	-0.674 (3.96)***	-0.455 (1.66)	-0.613 (3.90)***	-0.488 (1.95)**
Village 7	0.12 (1.49)	-0.534 (2.33)**	-1.289 (4.05)***	-0.391 (2.11)**	-0.882 (1.33)
Village 8	-1.03 (8.73)***	-0.791 (5.28)***		-0.623 (3.18)***	
Village 9	-0.42 (3.00)***	-0.296 (1.82)*	-0.100 (0.38)	-0.216 (1.38)	0.126 (0.38)
Correction for selectivity				-0.317 (2.63)***	-0.384 (1.47)
No. of observations	66	97	43	97	43
Mean of dependent variable	3.187	2.721	3.048	2.721	3.048
Adjusted R-squared	0.32	0.37	0.45	0.409	0.467
Standard error of equation	0.413	0.496	0.578	0.481	0.571

Source: Derived from our Fieldwork Survey.

Note: *** = Significant at the 1% level; **= Significant at 5%;*= Significant at 10%. The t-ratios in brackets.

Table 2.4.2 The production function for OAEs (in Translog form)

	1	2	3	4
	Restricted form without sample correction	Restricted form with sample correction	Full specification without sample correction	Full specification with sample correction
Constant term	9.941	9.551	10.091	9.328
	(12.47)***	(11.13)***	(12.36)***	(10.40)***
Log Labour (in working days)	0.429	0.452	0.439	0.460
	(1.36)	(1.45)	(1.34)	(1.50)
Log Capital	0.159	0.220	0.223	0.210
	(1.77)*	(2.54)***	(2.05)**	(2.06)**
Log hired labour (working days)	0.186	0.159	0.143	0.173
	(1.38)	(1.24)	(1.05)	(1.40)
Education of household head (years in full time schooling)	0.105	0.126	0.100	0.135
	(1.84)*	(2.05)**	(1.78)*	(2.11)**
Experience of the head of household	-2.172E-02	-4.27E-02	-1.908E-02	-4.354E-02
	(0.53)	(0.95)	(0.44)	(0.92)
Experience of the head of household squared	1.799E-04	5.97E-04	1.183E-04	6.467E-04
	(0.29)	(0.84)	(0.18)	(0.86)
Village 1	-0.540	-0.913	-0.613	-0.972
	(1.29)	(2.07)**	(1.39)	(2.10)**
Village 3	0.148	0.170	0.304	0.040
	(0.22)	(0.27)	(0.43)	(0.06)
Village 4	-0.565	-0.568	-0.620	-0.564
	(1.90)*	(1.97)*	(2.04)**	(1.92)*
Village 5	0.197	0.211	0.223	0.194
	(0.64)	(0.68)	(0.69)	(0.59)
Village 6	-2.993	-3.523	-3.053	-3.601
	(2.33)**	(2.71)***	(2.36)**	(2.74)***
Village 7	-0.443	-1.024	-0.494	-1.125
	(1.02)	(1.81)*	(1.02)	(2.00)**
Village 8	0.495	-0.097	0.632	-0.353
	(0.48)	(0.1)	(0.60)	(0.32)
Village 9	-0.660	-0.833	-0.606	-0.877
	(2.62)***	(3.14)***	(2.41)**	(2.96)***
Log labour squared term	-0.533	-0.566	-0.584	-0.525
	(2.00)**	(2.21)**	(2.02)**	(1.90)*
Labour * capital	0.263	0.238	0.258	0.229
	(1.65)*	(1.56)	(1.65)	(1.51)
Labour*hired labour	-0.015	0.016	0.007	0.011
	(0.21)	(0.22)	(0.09)	(0.15)
Log capital squared term	-0.006	0.001	0.000	0.001
	(0.40)	(0.09)	(0.02)	(0.05)
Capital*hired labour	-0.020	-0.022	-0.022	-0.020
	(1.31)	(1.43)	(1.45)	(1.30)
Hired labour squared term	0.024	0.014	0.015	0.015
	(0.56)	(0.34)	(0.34)	(0.40)
Possession of non-farm skills			-0.292	0.154
			(1.02)	(0.45)
Being CP member			-0.001	-0.129
			(0.00)	(0.29)
Correction for selectivity		0.576		0.691
		(2.20)**		(2.17)**
Daily marginal products of labour		**18.97**		
Daily marginal products of hired labour		**13.47**		
No. of observations	**82**	**82**	**82**	**82**
Adjusted R-squared	**0.72**	**0.73**	**0.72**	**0.73**
Standard error of equation	**0.886**	**0.870**	**0.894**	**0.884**

Source: Derived from our Fieldwork Survey.

Note: *** = Significant at the 1% level; **= Significant at 5%; *= Significant at 10%. The t-ratios are in brackets.

Table 2.4.3 The Earnings Function (full specification)

	Without Selectivity Correction			**With Selectivity Correction**	
	1 Wage workers in farming	2 Local wage OFAs	3 Migrants	4 Wage workers in OFAs	5 Migrants
Constant	2.771	1.964	-0.107	3.014	0.676
	(8.39)***	(6.27)***	(0.17)	(6.44)***	(0.73)
Male	0.099	0.244	-0.275	0.091	-0.280
	(0.91)	(1.97)**	(1.44)	(0.74)	(1.54)
School years	0.017	0.029	0.295	-0.014	0.260
	(0.59)	(1.04)	(5.18)***	(0.42)	(3.97)***
Experience	0.048	0.065	0.123	0.078	0.114
	(2.55)***	(3.00)***	(2.95)***	(4.60)***	(2.67)***
Experience-squared	-0.001	-0.001	-0.002	-0.001	-0.002
	(2.18)**	(2.53)***	(1.78)*	(4.01)***	(1.29)
Village 1	-0.051	0.440	-0.440	1.219	-0.550
	(0.30)	(1.11)	(1.87)*	(2.75)***	(2.41)**
Village 3	-0.802	0.024		0.197	
	(5.20)***	(0.10)		(0.74)	
Village 4	-0.324	-0.355	-0.672	-0.018	-0.691
	(1.39)	(1.63)	(2.45)**	(0.08)	(2.57)***
Village 5	-0.140	-0.422	-0.322	-0.106	-0.218
	(0.87)	(2.63)***	(0.83)	(0.51)	(0.35)
Village 6	-0.250	-0.720	-0.673	-0.542	-0.660
	(1.90)*	(4.27)***	(2.12)**	(3.26)***	(2.39)**
Village 7	0.116	-0.570	-1.684	-0.288	-1.293
	(1.28)	(2.56)***	(4.88)***	(1.43)	(1.79)*
Village 8	-1.034	-0.760		-0.497	
	(8.41)***	(5.16)***		(2.43)***	
Village 9	-0.438	-0.309	-0.126	-0.178	0.057
	(3.02)***	(1.97)**	(0.44)	(1.13)	(0.16)
Possessing agricultural skills	-0.016				
	(0.16)				
Possessing non-agricultural skills		-0.110	0.527	-0.298	0.432
		(0.75)	(2.01)**	(1.94)**	(1.33)
Party membership	0.153	0.213	-0.586	-0.311	-0.481
	(0.45)	(2.06)**	(1.57)	(1.29)	(0.75)
Correction for selectivity				-0.573	-0.302
				(2.88)***	(1.16)
No. of observations	**66**	**97**	**43**	**97**	**43**
Mean of dependent variable	**3.187**	**2.721**	**3.048**	**2.721**	**3.048**
Adjusted R-sq	**0.293**	**0.376**	**0.453**	**0.423**	**0.453**
Standard error of equation	**0.420**	**0.495**	**0.579**	**0.476**	**0.579**

Source: Derived from our Fieldwork Survey.

Note: *** = Significant at the 1% level; **= Significant at 5%;*= Significant at 10%. The t-ratios in brackets.

Table 2.4.4 Earnings Functions for Sub-groups of Local waged OFAS

	Key variables			More variables		
	1	2	3	4	5	6
	Public jobs	TVEs jobs	private jobs	Public jobs	TVEs jobs	Private jobs
Constant	0.037	2.786***	1.906***	-0.075	3.784	2.022
	(0.07)	(6.54)	(3.69)	(0.15)	(9.05)***	(4.15)***
Male	0.253	0.173	0.662***	0.228	0.083	0.676
	(1.12)	(1.09)	(3.46)	(1.12)	(0.58)	(3.41)***
Education in	0.097	-0.041	0.032	0.108	-0.120	0.014
years	(1.43)	(0.92)	(0.70)	(1.83)*	(2.72)**	(0.31)
Experience	0.131***	0.053*	0.040	0.112	0.024	0.043
	(2.92)	(2.00)	(1.41)	(2.34)**	(1.15)	(1.54)
Experience	-0.002**	-0.001**	-0.000	-0.002	-0.001	-0.001
squared	(2.39)	(2.21)	(0.70)	(2.34)**	(2.25)**	(0.94)
V1	1.506***		-0.183	1.578		-0.408
	(5.82)		(1.20)	(9.63)***		(0.91)
V3	0.730**	-0.333		0.817	-0.232	
	(2.29)	(0.96)		(3.69)***	(0.88)	
V4	-0.407	-0.502**	-0.440*	-0.282	-0.420	-0.439
	(1.46)	(2.38)	(1.69)	(1.71)	(1.85)*	(1.71)*
V5	-0.295	-0.272	-0.424	-0.331	-0.068	-0.412
	(1.05)	(1.46)	(1.38)	(1.86)*	(0.36)	(1.34)
V6	-0.578**	-0.481**	-1.260***	-0.327	-0.707	-1.296
	(2.41)	(2.33)	(4.95)	(2.65)**	(5.41)***	(5.07)***
V7	0.002	-0.497*	-1.206**	0.215	-0.586	-1.199
	(0.01)	(1.98)	(2.32)	(1.26)	(3.01)***	(2.30)**
V8	-0.273		-1.157***	-0.149		-1.117
	(1.07)		(5.56)	(0.83)		(6.13)***
V9	0.025	-0.311	-0.284	0.180	-0.320	-0.282
	(0.09)	(0.80)	(1.29)	(1.06)	(1.46)	(1.25)
Non-agricultural				0.134		0.227
skills				(0.91)		(0.61)
Party member				0.437	0.688	
				(2.00)*	(3.96)***	
No. of observation	**25**	**27**	**45**	**25**	**27**	**45**
Mean of dependent variable	**2.881**	**2.589**	**2.710**	**2.881**	**2.589**	**2.710**
Adjusted R-sq	**0.423**	**0.279**	**0.47**	**0.467**	**0.514**	**0.464**
Standard error of equation	**0.494**	**0.378**	**0.505**	**0.475**	**0.310**	**0.508**

Source: calculated from the Fieldwork Survey.

Note: *** = Significant at 1%, ** = Significant at 5%, * = Significant at 10% and t-ratios are in the bracket.

Table 2.5.1 Simulations of Mean Earnings

	Household agriculture	Wage workers in farming	Wage workers in OFAs	OAEs	Migrants
Household agriculture	**11.83**	23.24	12.79		11.89
Wage workers in farming		**27.24**	22.34		23.88
Wage workers in OFAs		25.45	**18.42**		20.89
OAEs		25.58	29.72	**41.96**	22.74
Migrants		28.03	27.34		**30.84**

Sources: Derived from our Fieldwork Survey.

Notes:

1. Mean earnings are per day (in Yuan).
2. The highlighted figures along the diagonal are the reported earnings.
3. Comparisons of earnings should be across different columns in the same row.

Table 2.5.2 The Simulation of Mean Earning for the Sub-Groups of Local Waged OFAs

	Public-sector employment	Employment in TVEs	Employment in privately owned OFAs
Public-sector employment	**21.89**	15.63	17.76
Employment in TVEs	9.70	**14.78**	11.61
Employment in privately owned OFAs	13.33	17.91	**18.69**

Sources: Derived from our Fieldwork Survey.

Notes:

1. Mean earnings are per day (in Yuan).
2. The highlighted figures along the diagonal are the reported earnings.
3. Comparisons of earnings should be across different columns in the same row

Appendix Table 2.1 The application of the multinomial logit model (1): the value of the coefficients and their level of significance

	1	2	3
	OFAs	OAEs	Migration
Constant	-5.634 (-3.86)***	-3.288 (-2.81)***	-6.473 (-2.98)***
Male single	1.503 (2.35)**	0.591 (1.05)	1.365 (1.57)
Female single	1.334 (1.61)	0.713 (1.04)	1.989 (2.08)**
Male married	0.963 (3.23)***	0.395 (1.67)*	0.374 (0.90)
Experience	-8.96E-03 (-0.15)	-2.71E-02 (-0.52)	5.90E-03 (0.06)
Experience squared	1.32E-04 (0.12)	2.64E-04 (0.28)	-8.07E-04 (-0.39)
School years	0.199 (2.52)***	4.31E-02 (0.64)	0.325 (2.70)***
In possession of agricultural skills	1.681 (3.02)***	0.556 (0.92)	0.994 (1.32)
In possession of non-agricultural skills	1.832 (4.53)***	2.059 (5.22)***	1.589 (2.78)***
Party membership	1.427 (2.95)***	0.124 (0.21)	-8.33E-02 (-0.07)
Village or township leader in the household	1.229 (2.30)**	-6.10E-02 (-0.09)	-0.171 (-0.15)
Village's distance to the provincial capital city	7.75E-03 (0.29)	-7.46E-03 (-0.39)	6.66E-02 (1.73)*
Village's distance to the nearby highway	2.32E-02 (0.28)	-5.65E-02 (-0.77)	-0.598 (-2.86)***
Village located at the township seat	0.978 (1.30)	1.192 (1.92)*	-3.169 (-2.25)**
Village possessing industrial advantages	1.989 (3.12)***	1.086 (2.37)**	1.028 (1.03)
Village having collective enterprises	1.292 (1.50)	-0.924 (-1.11)	-3.456 (-2.21)**
No. of workers in each household	-6.19E-02 (-0.43)	0.340 (2.87)***	8.47E-02 (0.42)
Dependency ratio	2.79E-02 (0.10)	0.664 (3.41)***	0.670 (2.11)**
Log-likelihood	**-683.7495**		
Restricted log-likelihood	**-846.5628**		
The Likelihood ratio index	**0.19**		
Number of observations	**949**		

	Predicted				
Actual	0	1	2	3	Total
0	650	10	14	1	675
1	67	21	9	0	97
2	96	7	30	1	134
3	31	6	4	2	43
Total	844	44	57	4	949

Source: Derived from our Fieldwork Survey.

Note: *** = Significant at the 1% level; ** = Significant at 5%; * = Significant at 10%. The t-ratios are in brackets.

Appendix Table 2.2 The application of the multinomial logit model (2): the marginal effects and their level of significance

	1	2	3	4
	Farming	OFAs	OAEs	Migration
Constant	0.725 (4.47)***	-0.365 (-2.82)***	-0.264 (-2.15)**	-9.64E-02 (-1.74)*
Male single	-0.163 (-2.22)**	0.100 (2.02)**	4.28E-02 (0.78)	2.01E-02 (1.17)
Female single	-0.172 (-1.85)*	8.63E-02 (1.42)	5.50E-02 (0.83)	3.07E-02 (1.45)
Male married	-9.90E-02 (-3.15)***	6.47E-02 (2.53)***	3.00E-02 (1.27)	4.33E-03 (0.60)
Experience	2.86E-03 (0.42)	-4.14E-04 (-0.10)	-2.61E-03 (-0.51)	1.65E-04 (0.10)
Experience squared	-2.03E-05 (-0.17)	8.24E-06 (0.11)	2.65E-05 (0.29)	-1.44E-05 (-0.39)
School years	-2.05E-02 (-2.29)**	1.34E-02 (2.16)**	1.92E-03 0.30 ()	5.18E-03 (1.65)*
In possession of agricultural skills	-0.166 (-2.09)**	0.114 (2.63)***	3.85E-02 (0.67)	1.36E-02 (1.04)
In possession of non-agricultural skills	-0.316 (-5.00)****	0.111 (3.37)***	0.184 (3.99)***	2.07E-02 (1.68)*
Party membership	-9.73E-02 (-1.30)	0.101 (2.71)***	1.94E-04 (0.00)	-3.57E-03 (-0.19)
Village or township leader in the household	-6.77E-02 (-0.82)	8.83E-02 (2.19)**	-1.62E-02 (-0.24)	-4.44E-03 (-0.23)
Village's distance to the provincial capital city	-7.35E-04 (-0.28)	5.27E-04 (0.28)	-9.30E-04 (-0.49)	1.14E-03 (1.27)
Village's distance to the nearby highway	1.18E-02 (1.29)	2.94E-03 (0.50)	-4.62E-03 (-0.63)	-1.01E-02 (-1.49)
Village located at the township seat	-0.121 (-1.51)	6.37E-02 (1.16)	0.115 (1.83)*	-5.76E-02 (-1.41)
Village possessing industrial advantages	-0.232 (-3.57)***	0.131 (2.44)***	8.81E-02 (1.88)*	1.28E-02 (0.74)
Village having collective enterprises	4.97E-02 (0.51)	0.105 (1.61)	-9.55E-02 (-1.14)	-5.88E-02 (-1.36)
No. of workers in each household	-2.74E-02 (-1.71)*	-7.44E-03 (-0.72)	3.39E-02 (2.63)***	8.72E-04 (0.26)
Dependency ratio	-6.95E-02 (-2.36)**	-4.60E-03 (-0.23)	6.39E-02 (3.03)***	1.01E-02 (1.56)

Source: Derived from our Fieldwork Survey.
Note: *** = Significant at the 1% level; ** = Significant at 5%; * = Significant at 10%. The t-ratios are in brackets.

Chapter 3

DIVERSIFICATION OF HOUSEHOLD INCOME GENERATING ACTIVITIES IN RURAL CHINA: DETERMINANTS AND CONSEQUENCES[29]

3.1 Introduction

It has long been recognised that the rural sector of most developing countries contains a veritable army of largely underemployed peasant households (Lewis, 1954), and is characterised by "incomplete or partial markets" (Ellis, 1993:13). Since at least the end of the 1970s, the countryside of the PRC is no exception. Although it is difficult to be certain about the precise size and incidence of the problem, it is estimated that there are at least 200 million "surplus" rural workers (the State Statistic Bureau, 2001). This waste of human resources and potentially explosive social situation has arisen from a variety of

[29] Before formally starting Chapter 3, it would be necessary to explain how this chapter adds to the general results already expressed in Chapter 2, this is because at surface these two chapters look rather similar.

The purposes of Chapter 2 are aimed at modelling the allocation process of off-farm activities between individual rural workers, and investigating the determinants of the earnings of a variety of off-farm activities. In short, Chapter 2 emphasizes on the perspective of individual workers. This is because some income generating activities such as off-farm wage employment and out-migrating employment can only be addressed from the perspective of individual workers.

In contrast, Chapter 3 examines the allocation process of both farming and off-farm activities between rural households, and what rural households can gain from diversifying income sources away from the conventional grain farming. The reason that the focus of Chapter 3 is moved away from individual rural workers to rural households is that some income generating activities such as household farming and family non-farm enterprises are more or less household behaviour, their income are the outcome of the family's collective effort such as decision making, management, labour, etc. Within the household, how much a working member should work and s/he can earn couldn't fully be explained by her/his own human capital, because it is decided by the entire household's decision making, management level, etc.

From these reasoning, It could be argued that Chapter 3 is complementary to Chapter 2 in the sense that putting Chapter 2 and Chapter 3 together would render us better understanding of Chinese rural income generating activities.

underlying sources over the last quarter century of rapid change. A raft of wide-ranging institutional reforms, beginning in 1978, has transformed the erstwhile collectivist organisational arrangements into something resembling a proto-capitalist structure. The main milestones have been the abolition of the collectivised agriculture and the introduction of the household contract responsibility system, the relaxation of the *hukou* (household registration) and, most recently, in 1998, the revision to the Land Administration Law. In principle, peasant households are now free to make their own decisions about choice of livelihood, and how and when to participate in emerging markets. In reality, as our field work and other literature (Byrd & Lin, 1990; Knight & Song, 1997; Cook, 1999; Song, 2000; Chapter 2 of this thesis) have shown, rural households have extensively diversified from grain farming into a range of other agricultural and non-agricultural income generating activities: cash-crop production, local non-agricultural family business, local non-farm wage employment and out-migration. The main aim of this chapter is to explore an important dimension of this process at the provincial, grass-roots level. Rather than examine diversification of rural livelihood in broad sense (Ellis, 1997), this chapter is to investigate on the determinants of rural households' choice of income generating activities, and what rural households gain from active diversification into a broad variety of income generation activities compared to conventional grain farming.

As our rural household survey has shown, the majority of rural households (71%) have diversified their income generation activities. Those who are left behind continue selling their conventional grain products to the government at fixed prices assume least market risk, hence reap the fewest rewards and encounter predictable and growing constraints such as rising land scarcity, informational blockages and seasonal underemployment. Most of the early models of rural development, such as those associated

with Lewis (1954), and Ranis and Fei (1961), assumed that the marginal product of these farmers was low or even negative. Here we are not concerned with rehearsing the twists and turns of the debate that followed (Harriss, 1982; Breman and Mundle 1991); rather, our purpose is to place firmly the experience of the PRC as a "late-starter" into this general context.

One type of income source diversification, although still wedded to agriculture, is to opt for different extents of a more variegated mix of labour-intensive crops, animal husbandry, market gardening, poultry rearing and aquatic production – particularly fish-farming (all hereafter shortened to "cash crops"). Both Lu (1998) and a joint UNDP-World Bank study (2000) demonstrate that the incidence of this sub-sector is growing strongly. Clearly the prospective returns are outweighing the enhanced level of risk associated with rapid price shifts and the difficulties of storing perishables. This pattern of what might be called "first-step" diversification is reasonably consistent with both the labour-release (Lundhal, 1983) and aspects of the neo-Populist traditions (Lipton, 1977).

Two further types of household take diversification much further down the line of non-agricultural activities. In addition to selling any product or service to hand, a third category might choose to deploy the surplus labour time of members by seeking waged work, perhaps locally, but more likely through distance-migration. Evidently, to set against the prospect of tapping into new streams of money income there are risks to this strategy in the form of employment uncertainties. Were it not for the continuation of the *hukou*, this of course, would be the classic case of the traditional sector - shedding younger generations of unattached household members. Nevertheless there is mounting evidence suggesting that the incidence of this redistribution of labour has been accelerating (Song, 2000) and that the returns exceed those possible in farming (Knight & Song, 1997). Finally, at the end of this rather simplified spectrum, there is the option of starting a non-agricultural

own-account enterprise (OAE hereafter). As the great majority of such rural enterprises are labour-intensive and operate in a milieu of low barriers to entry (or exit), local market conditions tend to be speculative: risks can be considerable, but so too can rewards (Guldin, 2001). The now extensive body of literature on the growth of TVEs - and their antecedents - in the Chinese countryside attests to the significance of this route of diversification (Byrd and Lin, 1990; Ho, 1994; World Bank, 1999; Chen, 2000).

Identifying the importance of the range of factors that determine the choice of income-generating activity of rural households is the principal goal of this study. In Chapter 2, it was argued that although certain political, demographic and locational circumstances have exerted a degree of influence upon micro-level decision-making, particularly with respect to helping some household members secure wage employment, by far the most compelling forces at work are straight-forwardly material.[30] The conclusion is that the more capable rural workers opted for off-farm activities. Further to that, this chapter identifies and analyses the determinants of rural households' choice of income generating activities, and investigates what rural households gain from diversification into cash-crop production and running OAEs in comparison to grain farming in terms of income, employment and returns going to household labour. To this end, in section 3.2 we introduce the data collected, outline our methodology and specify the models. In sections 3.3 and 3.4, we present and discuss the results. Finally, in section 3.5, we offer some general conclusions.

3.2 Data, methodology and model specification

[30] Such as that education is proving to be a potent factor in assisting rural inhabitants to secure local off-farm waged jobs, and is a significant human-capital attribute for migrants; the possession of a complement of non-agricultural skills further encourages rural workers to gain off-farm jobs; the political factors that we have been able to identify and model - party membership or having a local government official in the household - still have a positive influence, helping rural dwellers to obtain some increasingly restricted types of local off-farm wage employment.

3.2.1 Data

As we have given in Chapter 1 the detailed description of the fieldwork – a survey of 450 rural households conducted by the author in a clustering of nine villages scattered across Xinmin County of Liaoning Province of the northeast China in 1998, here only the relevant specification and variables are presented. Tables 3.1 & 3.1A present the relevant data in detail. Altogether 450 rural households were surveyed.[31] We were able to distinguish three main categories of income-generating households (see Section 1.4 of Chapter 1).

It is quite clear that most of the households had diversified to some degree (see Section 1.4 of Chapter 1). We can also report that this was not an irreversible decision as even those who had severed their links with farming (the NAHs) and decided to specialise in non-agricultural pursuits could, at least in principle, recall land rented-out since it remains collectively owned by the village as a whole. In this regard, Chinese rural dwellers are advantageously placed relative to many other peasant societies where title has been privatised. Although we had little direct access to reliable historical information on the evolutionary process of household diversification, it can be reasonably inferred that most NAHs passed through several phases of movement away from grain farming prior to either taking up wage work or operating an OAE. We concur with the general argument put forward by Ellis (1993: 96f) that changes in the relative value of labour time on- and off-farm is crucial when householders come to consider undertaking different commercial risks.

[31] Eight of the sample households were excluded as six did not engage in any productive activity whatever due to the elderly age composition, and two depended entirely upon farm labouring.

3.2.2 Modelling rural households' choice of income generating activities

The issue of why a rural household chose a particular income generating activity could be analysed by the multinomial logit model. It has been shown that apart from the conventional grain farming, a rural household can diversify its income source by engaging in cash crop producing, securing waged OFAs for its surplus labourers, and establishing and running an OAE. We divide the sampled households into three groups: those only engaged in farming, those diversified between farming and waged OFAs or only occupied in waged OFAs, and those diversified between farming and non-farm OAEs or specialised in OAEs. It can be assumed that the allocation of different types of income generating activities among rural households is the result of stochastic utility maximizing process. In general, the econometric modelling process here is almost the same to that in Section 2.3.1 of Chapter 2. To save space, we do not repeat here.

In rural China, arable land has been distributed on a generally equitable basis between cultivating households according to either the number of members or the number of farmers registered in each village. In principle, therefore, all households can work on their plot, so that household farming as an income generating activity occupies a fallback position. For this reason, we set household farming as the default option in the model.

The independent variables include household characteristics and location effects (Table 3.1). 'Having a party member in the household' and 'having a township or village leader in the household' will be used as convenient surrogates for 'non-market' or political influences. For human capital, as related to market forces, the fairly standard variables are chosen, namely, 'household head experience' (defined as potential working years after completion of full time school education), 'household experience squared', 'household head education' – as measured by years of schooling, 'possessing agricultural skills' and

'possessing non-agricultural skills'. Additionally, the 'number of workers in the household' and the 'dependency ratio in the household' are included to representing demographic factors. However, 'arable land in the household' cannot be regarded as an explanatory variable (the reasons detailed in Section 2.3.1 of Chapter 2).

In end, location dummy variables (by village) should be able to capture a spectrum of factors (also detailed discussion about this issue referred to Section 2.3.1 of Chapter 2).

3.2.3 Methodology and modelling the consequence of rural households' diversification of income generating activities

Three procedures are to be constructed to examine what rural households gain from diversification into cash-crop production and running OAEs in comparison from grain farming in terms of income, employment and returns to household labour. In the first, we set out to compare average daily net income and the number of working days for each of the different activities identified in the data set. In the second, we highlighted a group of factors that proxy the degree of diversification and then incorporated them as explanatory variables into household production functions. Rural households would benefit from higher degree of diversification if those variables were found to be statistically significant and possess positive signs. As far as the sample of agricultural households was concerned, to capture degree of diversification, there were two procedural options open: either to consider the existence of cash crop production as a dummy variable or, to determine the proportion of cash crop production in total agricultural output. Both could reasonably proxy the degree of diversification for rural households engaged in cash-crop producing. The latter would, measure of course, the degree of diversification for cash crops more accurately than the mere existence of such products; but for reasons of non-comparability,

we were unable to identify similar variables for the other household categories. For the third procedure, we compared returns to labour i.e., the marginal product across the different income-generating activities.

The second and third procedures hinged upon estimating household production functions. At the outset, it was unclear whether the Cobb-Douglas or the translog model would be the most appropriate (Berndt and Christensen, 1973; Jacoby, 1992). An important drawback of the former was that it imposed strong separability between the different factors. In contrast, the translog function permits flexibility, and allowed for linear and quadratic terms with an arbitrary number of inputs. Furthermore, it could be reduced to the multiple-input Cobb-Douglas function as a special case. Given these advantages, the translog production function was selected for the initial estimation exercise, and was followed-up with an F-test in order to consider the null hypothesis of a Cobb-Douglas functional form.

The well-known Cobb-Douglas production function is:

$$(1)\ \ln Y = \beta_0 + \sum_{j=1}^{K} \beta_j \ln X_j + \sum \gamma Z + \varepsilon$$

where Y is the income derived from household agriculture or the production of OAEs. X represents a vector of production factors including household labour - measured in working days, capital, land, and inputs in the case of agriculture, whereas for households running OAEs, the vector includes the number of working days of household members and hired workers, and capital. Z represents other relevant variables including: the educational attainment of the household head - measured in school years; the experience of the household head - defined as years of working following the completion of full-time education (after Mincer, 1974); the experience squared; and, finally, location dummy variables.

The translog function is:

$$(2)\ \ln Y = \beta_0 + \sum_{k=1}^{K} \beta_k \ln X_k + \frac{1}{2}\sum_{k=1}^{K}\sum_{l=1}^{K} \gamma_{kl} \ln X_k \ln X_l + \sum \gamma Z + \varepsilon$$

where X is a vector of production factors. Z represents other relevant variables as specified above. Due to the existence of the second-order terms, the coefficients of the log linear terms are difficult to interpret. This obstacle, however, can be overcome by substituting $(\ln X_k - \ln \overline{X})$ for lnX_k, where $\overline{X}$ is the geometric mean of input X_k. This transformation means that β_k are just the production elasticities since all the second order terms vanish as the Taylor Series is expanded at $\overline{X}$ (Jacoby, 1992). As in the Cobb-Douglas function, other shift variables such as human capital and location may be added in a non-logarithm form.

A central purpose of estimating the production function was to derive the marginal product of the factors. For the labour input, for example, the marginal product may be derived from equation (1) as follows:

$$(3)\ Y = AL^{\alpha} K^{\beta} Land^{\gamma} \varepsilon$$

where Equation (3) is just the original form of Cobb-Douglas production, Y denotes output, A denotes the constant term, L for labour input, K for capital, *Land* for land input, ε for error term, superscript α for elasticity or share of labour, superscript β for elasticity or share of capital, superscript γ for elasticity or share of land. If we put Equation (3) in logarithm and differentiate it by labour L, then we get:

$$\frac{\partial(\ln Y)}{\partial L} = \frac{\partial(\ln A)}{\partial L} + \alpha \frac{\partial(\ln L)}{\partial L} + \beta \frac{\partial(\ln K)}{\partial L} + \gamma \frac{\partial(\ln land)}{\partial L}$$

$$(4)\ \frac{1}{Y}\frac{\partial Y}{\partial L} = \alpha \frac{1}{L}$$

$$\frac{\partial Y}{\partial L} = \alpha \frac{Y}{L}$$

where $\partial Y/\partial L$ is the marginal product of labour and Y/L the average product of labour. Therefore, the former is the product of α and the average product of labour. Of course, the marginal product of the other factors of production may be derived by the same method.

In the translog function, the transformation of the factors of production makes the coefficients of the first-order term of the log of the production factors be their production elasticity. Hence, the marginal products were derived in this manner.

The dependent variable for OAE production was a household's annual net (OAE) income (or value-added) (see Footnote 18). However, for the production of agricultural commodities contributed by the "Agricultural Households", we needed to consider annual total agricultural income. This was because no less than 73 households received negative net income and we would lose much information if they were to be excluded from the analysis. Such procedure did not prove to be a particularly distorting step as our regression results using total income are comparable to those using only the net figure.

(4) Value-added = total output – inputs

$$(5)\ \frac{\partial(Value-added)}{\partial(Labour)}=\frac{\partial(Totaloutput)}{\partial(Labour)}-\frac{\partial(Input)}{\partial(Labour)}$$

where $\partial(Input)/\partial(Labour)$ is zero, because the inputs here were intermediates including seed and fertiliser, and had little or no direct relationship with labour. Therefore, using total production, rather than value-added, did not affect the derivation of the marginal product of labour.

The explanatory variables of household agriculture and the production functions of the OAEs included: logarithmic production factors, the number of school years of the head

of household, the experience of the household head and its quadratic term, and dummy variables for location. This form of the production function may be of considerable use in capturing the full effects of important explanatory variables such as productive factors and human capital (Appleton *et al.*, 2000).

We use gross outputs before taxes and fees in our analysis of agricultural production since many local governments exhibit a pronounced tendency to levy notoriously arbitrary charges. Thus, were we to have deducted them, the productivity of household agricultural production would have been distorted. We should note that the lump sum tax on each of individual villagers did not unduly affect the decision-making process of the farmers concerned.

3.3 Results of econometric modelling of rural households' choice of income generating activities

The results of the multinomial logit modelling include the coefficients of the independent variables (Table 3.2.1), their marginal effects (Table 3.2.2) and the predicted probabilities of the dummy independent variables (Table 3.2.3). For the dummy variables, the effects upon the households' choice of activities are assessed by the predicted probabilities estimated at the means of the explanatory variables. For the continuous variables - such as experience and education, the marginal effects are informative. Overall, the goodness of fit of the model measured by the likelihood ratio is 0.20 or 80% as measured by the percentage of correct predictions. The base line probabilities for the rural households' choice of activities at the mean of the explanatory variables are 73.0% for household farming, 14.6% for diversification into wage work in OFAs, 12.4% for diversification into OAEs.

Now we turn to the explanatory variables. Of the two "non-market" or political variables, namely, "having a party member in the household" and "having a village or township leader in the household", only the latter have a marginally significant effect on the probability securing a waged OFA. This result is not unexpected because in the Chinese context, being a member of the communist party itself would not mean political influence or power taken for granted unless the relevant person was an appointed official holding certain power in the same time (other detailed explanations have been discussed in Section 2.4 of Chapter 2).

After the non-market factors, the next host of explanatory variables is market forces embodied by human capital. In this research, human capital comprises the variables "household head's years of schooling", "household head experience", "household head experience squared", "household possessing agricultural skills" and "household possessing non-agricultural skills". We may see from Table 3.2.1 that experience and the experience-squared term are both insignificant in affecting rural households' choice of income generating activities. This result is similar to the findings in Section 2.4 of Chapter 2.

With respect to the most important aspect of human capital endowment – education, we can report (Table 3.2.2) that the marginal effects of school years are marginally significant in terms of household farming, members of a household engaged in waged OFAs - but not upon OAEs. An extra year's schooling raises the probability of a household diversified into a waged OFA by 2.6%. In contrast, an extra year of education would reduce the probability of a household staying at household farming only – in this instance by 2.8%. These findings are consistent with that were reported in Section 2.4 of Chapter 2.

The next recognizable human capital is skill (Table 3.2.3). It could be expected that the possession of non-agricultural skills encourage rural households to diversify into off-farm activities. This expectation is confirmed by our results. However, we also find that

the possession of agricultural skills actually reduces the probability of a rural household engaging in household farming and helps its members obtaining waged OFA jobs. The findings about the effect of skills here are also in harmony with we have found in Section 2.4 of Chapter 2.

The third group of explanatory variables are demographic or social factors. Both the two demographic variables "number of household workers" and "dependency ratio" exert significant effects upon household farming and OAEs but not on households involved with waged OFAs. An extra worker at the household would raise the probability of the household engaged in non-agricultural OAEs by 10.9% and reduce the probability of remaining with household farming by 17.3%. An increase by one unit of the dependency ratio induces a rise of 11.5% probability of pursuing OAE as well as upon the more directly obvious household farming activity (a fall of 14.5%). As we have stressed that low income, underemployment in household farming (reported in Table 3.1), heavy life burden and in particular the scarcity of waged OFA job opportunities are working together to push rural dwellers without much political contacts into non-agricultural OAEs.

Finally, location effects are to be interpreted in the same way as in Section 2.4 of Chapter 2, so that it not necessary to repeat it here again.

3.4 Results of econometric analysis of rural households' gains from diversification of income generating activities

Here we discuss the modelling process of the production functions and go on to interpret the results. Our points of reference are in Tables 3.3, 3.4 and 3.4A.

3.4.1 Model description of the production functions

We estimated the production functions for (i) the agricultural production, inclusive of cash crops, of the AHs and the DHs; and, (ii) the value of the non-agricultural production of the DHs and the NAHs. To determine the pattern of rewards for the range of agricultural activities with and without cash-crop products, Chow's structural tests were conducted. The null hypothesis is that the coefficients of the two production functions are similar or that two groups of observations can be pooled. However, the result rejected the null hypothesis. This led us to conclude that indeed there were different patterns across the agricultural production of the AHs and DHs.

Choice of function. For the agricultural productions of both the AHs and DHs, we simply adopted Cobb-Douglas production function. The reasons are as follows. For DHs' agricultural production without or with cash crops, the number of observations is less than the number of explanatory variables (77) that Translog function imposed. To the AHs without or with cash crops producing, although the number of observations is a bit more than that of explanatory variables of Translog function, the small number of degree of freedom would lead to biasness of estimation.

To the DHs and NAHs' OAE production functions, the F tests cannot reject the null hypothesis of Cobb-Douglas model and so for these two production functions, the Cobb-Douglas form was utilised.

Treatment for the potential endogenous variables. The number of working days by household (subsequently referred to as "labour") has the potential of being endogenous to the explained variable, value of agricultural or non-agricultural output. To overcome this problem an instrumental variable model (hereafter *IV*) was deployed. In order to derive the

predicted number of working days, demographic variables revolving around the ratio of each of five age groups to the number of household members are constructed. The groups were: 0 to 6 year-old; 7 to 10; 11 to 15; females from 16 to 60; and those above 61. The age group, 16 to 60 year-old male, was dropped to avoid statistical trap.

For estimating all the production functions bar the NAHs' OAE activities, the OLS approach was used. This was for two reasons. First, an application of the F test could not reject the null hypothesis that demographic *IV* variables were not statistically significant in predicting labour. Second, an application of the Hausman test also cannot reject the null hypothesis of no endogeneity for the (five) production functions.[32] With respect to the exceptional case of the NAHs, the Two-Stage Least Squares method was used for estimation. The reasoning here was that, an F test at the 8% significant level marginally rejected the null hypothesis that these demographic IV variables are not statistically significant in predicting labour, and Hausman test also at the 8% significant level marginally rejected the null hypothesis of no endogeneity. Furthermore, the over-identification tests[33] cannot reject the null hypothesis that the instruments are valid.

Heteroscedasticity. For three of the production functions namely, AHs' agricultural activities without cash-crops, and DHs' agricultural and OAE productions, an application

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[32] The Hausman test is for detecting measurement error. The null hypothesis is no measurement error under which both b (the least square estimator) and b_{IV} (the *IV* estimator) is a consistent estimator of β, but that the former is efficient and the latter, not. Should the null hypothesis be rejected, only the *IV* estimator is consistent. The formula is:

$$W = (b_{iv} - b)'[V_{iv} - V](b_{iv} - b) \sim \chi^2[k]$$

where $V = s^2(X'X)^{-1}$ is the estimated covariance matrix for the least square estimator, and *Viv* the estimated asymptotic covariance matrix for the *IV* estimator (Greene, 1999: 383-387).

[33] The over-identification test is used to test the joint hypothesis that original model is correctly specified and that the instruments are valid. To get the over-identification test statistic, one firstly need to regress the *IV* model residuals on the instrumental variables, then multiply the (unadjusted) *R*-squared statistic from the regression by the sample size *n*. The null hypothesis is that the original model is correctly specified and the instruments are valid. The test is distributed as Chi-squared distribution with degree of freedom *k'-k*, where *k'* is the number of *IV* variables which include the other independent variables in the model and the demographic instrumental variables, and *k* is the number of independent variables of the original model. (Davidson and Mackinnon, 1993:235-236; Deaton, 1997:112).

of the Cook-Weisberg (STATA 7 Reference, Volume 3, pp. 107) test can not reject the null hypothesis of no heteroscedasticity. For NAHs' OAEs production function, heteroscedasticity could not be tested as it had been estimated by the Two-Stage Least Squares method (*IV* model). This left the cash-crop function of the AHs with heteroscedasticity. In this case, we use White's heteroscedasticity-consistent standard error.

Goodness of Fit. The AHs and DHs' agricultural production functions without cash crops got relatively high goodness of fit measured by the adjusted R-squared statistic; they are 0.75 and 0.72 respectively. However, for the AHs and DHs' agricultural production with cash crops, and DHs and NAHs' OAEs production functions, the adjusted R-squared statistics are somewhat lower but still fairly respectable; they are in the range of 0.47 to 0.54.

Sample Selection. The only feasible correction was for the NAHs' OAE production by utilising the Heckman procedure, i.e., with a probit modelling whether rural households specialised in non-agricultural OAEs. The selectivity correction term was not found to be significant statistically. For the other production functions, there were no appropriate procedures. This was because the DHs operating OAEs overlapped with their agricultural activities with or without cash crops. Moreover, even the AHs' agricultural activities would have to be estimated in two sub-groups *viz.* with or without cash crops. Therefore, all the production functions presented here were without correction of sample selectivity.

3.4.2 Results of the three procedures of investigation

Our initial procedure is to compare average daily net income and the number of working days across the different activities. Based on our survey, the annual income per capita of the DHs (3051 yuans) was found 2.8 times as much as that for the AHs (1087 yuans). A far larger differential, over 6.6 times, was earned by the NAHs (7174 yuans). The average number of days worked per annum for those AHs engaged in grain cultivation was just 192; for those AHs producing cash-crops it was 225; for the DHs, 244 days; and, finally, for the NAHs, it was 296. In addition, those DHs (17%) and NAHs (32%) that operated OAEs created wage-work for fellow villagers: each of the former hired-in the equivalent of 390 working days, and each of the latter as many as 433 days. Finally, with regard to differences in product of labour (Table 3.4A), the average daily net product of labour for those AHs producing cash-crops (11.70 yuans) was slightly higher (7%) than the grain producers (10.91 yuans). A very similar result held for the agricultural production of the DHs with cash crops compared to those without. More generally, the average returns to labour in agriculture for DHs were almost twice those for the AHs. The OAEs of both the DHs and the NAHs produced far more in term of the average daily net income than the AHs: for the former, the figure was 2.5 times (35.32 yuans); and for the latter, four times (53.87 yuans). We may therefore conclude that the higher degree of diversification of income sources, the higher the level of income and employment.

The second procedure was to ascertain the significance of those variables representing the degree of diversification for the agricultural activities of the AHs and DHs' (Table 3.3). We used the existence of cash crops as a dummy variable for measuring the influence of diversification (with a score of one indicating a household engaged in cash-crop production, and zero without). For the AHs, the coefficient of the variable (0.24) was statistically very significant, whereas for the DHs, the coefficient of the same dummy variable (0.23) was marginally significant. The results suggest that the total agricultural

output of both the AHs and DHs households be around a quarter higher than those who had not diversified into cash crops. To examine the degree of diversification associated with cash-crop production in further detail, we proceeded to include its proportion in the total agricultural output of each household as an explanatory variable in the production functions estimated for both AHs and DHs (Table 3.3). For the former, the coefficient (1.06) proved significant suggesting that the output of these households will increase by 10.6% as the proportion of cash crops rises by 10%. For the latter, however, the coefficient of the variable (0.54) was nearly marginally significant statistically; if we interpret in the same way, the output of the DHs would be boosted by 5.4% as the proportion of cash crops goes up by 10%. On this criterion of assessing degree of diversification, then these rigorous results indicate that rural agricultural households do gain significantly from diversification into cash-crop production in term of income.

Our third procedure was to compare the marginal product of labour among the different household income-generating activities (Tables 3.4 & 3.4A). As this was the most complex, the approach involved two stages. In the first stage, we considered agricultural activities with and without a cash-crop component. To avoid the influence of the other diversification effect caused by non-agricultural activities, we commenced with the AHs. As we have already noted above, the average daily net product of labour for the AHs producing cash-crops was slightly higher than those who did not. Their elasticities of labour are 0.42 and 0.22 respectively and statistically are very significant. Consequently, the hourly marginal product of labour (subsequently MP_L) for cash crop producing AHs was 0.61 yuans; this doubled the MP_L for the grain-producing households (0.30 yuans). A similar result was obtained when we made a similar comparison with the DHs that produced both with and without cash crops. Note that the hourly MP_L of those DHs not engaged in cash crops (0.47 yuans) was much bigger than the figure for those AHs also

without an involvement in cash crops (0.30 yuans). A similar result held when we compared DHs with AHs when both produced cash crops. Additionally, we also found that land elasticity for those AHs and DHs that had diversified into cash-crops were not significant at all, whereas the counterpart figures for AHs and DHs without cash-crops were 0.66 and 0.58 respectively and they are very significant statistically. This implies that cash-crop farming was rather less land-intensive (or at least less land-constrained) than grain cultivation. These findings not only suggest that diversification through cash-crop production leads to a higher (or equivalent) MP_L than those continuing to practice conventional grain farming, but also is consistent with the classical Lewis (1954) proposition that moving surplus labour out of the traditional sector raises the marginal product of labour left behind, in other words, the DHs diversifying into waged OFAs or an OAE raise the MP_L for their household workers left behind in agriculture.

The second stage of comparing the marginal products concerned the case of the OAEs in comparison with agricultural activities. We found that the elasticity of labour for DHs' OAE production (0.53) was much higher than the highest elasticity achieved by AHs diversified into cash-crop production (0.42). In turn, the corresponding figure for OAEs operated by the NAHs (0.83) was much higher than that of the DHs' OAE production (0.57). It has been stated above that average products of labour for these three kinds of households are also in the similar pattern. As regards the elasticity of hired labour, there were statistically very significant results for the OAEs operated by both the DHs (0.14) and the NAHs (0.15). With respect to the elasticity of capital, for the range of agricultural and OAE production, the results proved to be of little significance, though we should report that for the OAEs operated by the DHs (0.05) and the NAHs (0.03) the figures were not much different from the grain farmers (0.04). It therefore seems reasonable to infer that the OAEs run by both DHs and NAHs' were essentially labour-intensive, partly no doubt to

minimise the risks of operating in a market environment characterised by many types of imperfection.

The MP_L for the three categories of household also exhibit a similar pattern of differentials. The hourly MP_L for the OAEs run by DHs (2.34 yuans) was nearly one and half times in excess of the highest cash crops producing DHs MP_L (1.00 yuans); and, in turn, the MP_L of the OAEs run by the NAHs (5.56 yuans) was greater than that achieved in the OAEs run by the DHs by virtually the same order of magnitude. It was also found that the hourly MP_L of hired labour in the OAEs run by the NAHs (3.40 yuans) was 30% greater than that for the OAEs run by the DHs (2.59 yuans). Taken together, this evidence suggests that deeper diversification into non-agricultural activities has increased the returns to rural labour, and that the MP_L earned in the OAEs more than compensated for the enhanced levels of risk experienced by the DHs and indeed provided an incentive for these households to graduate to the ranks of NAHs. On the other hand, the considerable differentials of MP_L across the households amply confirm the constraining nature of the rural economy in terms of household members both acquiring wage employment and establishing an OAE. For the standard neo-classical position to hold there would need to be a tendency for the MP_L to equalise or at least converge. As this does not appear to be occurring in this instance, it can only be concluded that rural markets remain imperfect and incomplete; and there is robust evidence that this is not confined to our study area as similar results have been reached in other studies (Knight and Song, 1997; and Song, 2000). Nonetheless, there are some indications of equalisation within the general circumstances of partial markets. For example, the daily MP_L of OAEs contributed by DHs' own workers (18.72 yuans) is close to the average daily wages paid in the locally based OFAs (18.42

yuans).[34] In addition, the daily MP_L of hired labour working in the OAEs operated by both DHs (20.72 yuan) and NAHs (27.16 yuan) are not very far apart, and reveal that hiring workers must have been profitable. More speculatively, since the MP_L of these OAEs could not be separated from any rewards accruing to entrepreneurial ability (they would not be fully picked up by controlling the other variables in the production function including the educational attainment of the household head, experience and the quadratic experience term), the composite nature of the term for this category of households does cast some doubt upon its generality.

3.4.3 Returns to scale

Of the production functions considered (Table 3.4), increasing returns to scale were found in the exclusively grain farming AHs (1.14). The OAEs operated by the NAHs exhibited almost constant return to scale (1.01). Decreasing returns occurred in AHs engaged in cash-crop production and all of the recorded activities of the DHs. These results imply that, in term of scale economies, the specialised households were more efficient than those that had diversified – taking cash-crop production as evidence of that tendency.

In principle, since the average number of working days per annum of grain producers was considerably lower than that of the cash-crop producing AHs, there is potential for an expansion of cultivation. However, as the supply of arable land is very restricted, it would only be feasible for the grain farmers to acquire more of this vital resource when "surplus" labour has moved out of the sector thereby releasing some land. Compared with grain farming, the production of cash crops did generate additional local employment and enhanced the level of household income. It was also much less land-

[34] In our sample, 97 respondents had secured wage employment in a variety of local OFAs including public sector posts, and in both collectively- and privately-owned non-farm enterprises.

intensive. By way of contrast, operating OAEs was a highly labour-intensive activity and doesn't occupy arable land at all.

3.4.4 Other explanatory variables

The other explanatory variables specified in the production functions included the experience of the household head and its quadratic term (Table 3.4).[35] This did not prove to be statistically significant for the majority of activities except for the AHs with cash crops, for which it is 2.9% and statistically significant. The most likely explanation was that most rural inhabitants possessed a threshold level of common experience - doubtless acquired from household farming (Schultz, 1964) - but this was not particularly appropriate for either agricultural work or indeed for operating OAEs. For the exceptional case, i.e., AHs with cash crops, the effect of household heads' experience exhibits an inverse-U relationship with potential experience (defined as years since education was completed), peaking at 36 years of experience. In other words, an extra year of potential experience would raise their household products by 2.9% when evaluated at the mean value.

The education of the household head variable was statistically significant for those cash crops producing DHs. However, the t-ratios were less than one for the rest of agricultural activities. If education is indeed a good proxy for human capital in this peasant environment, there were few obvious returns to investing in years of schooling. This result implies that education offered little to enhance the value of conventional grain farming – which is still dominated by traditional methods. For the other OAEs categories of households, however, the t-ratios of the variable were all more than one. The returns for an

[35] Concerning these latter effects, Chapter 2 has offered a detailed interpretation of how villages and location influence the income-generating activities of rural households making use of the same data set as deployed here.

additional year of schooling for DHs with cash crops were 9.6%. When we considered returns for those operating OAEs, the rates are 8.5% for DHs and as much as 15% for the NAHs. Thus, the returns to investment in education followed the same course as the trends outlined for the MP_L across household activity types, and rose progressively with the extent of diversification.

3.5 Conclusion

Drawing upon our a survey of 450 rural households in Xinmin County of Liaoning Province, there is mounting verification that human capital in terms of education, skills either agricultural or non-agricultural – rather than political factors – are assuming more roles in assisting rural households to diversify into non-farm activities. Besides, given the nature of imperfect or underdeveloped markets prevailing in rural sector, it is not unexpected that demographic or social factors still work in the countryside. The more workers a rural household has and the higher the dependency ratio the household bears, the more likely the rural household diversifies into family non-farm business.

As far as what rural households gain from diversification is concerned, there is clear evidence that peasants who diversified into riskier activities than grain farming were able to raise family incomes and employment, and also enjoyed increasing returns to their labour time. Despite an environment of imperfect and incomplete markets, diversification into more commercialized agricultural or non-agricultural income-generation activities conferred considerable material advantages relative to the traditional dominant farming pursuit of the locality. All three of our statistical procedures revealed gain to those diversifying, and most gain to those who went furthest in assuming risk. Moreover, the returns to an investment in education increased notably with the extent of income source

diversification. Those households that managed to move surplus labour off-farm were able to enhance the marginal products of the labour for those remaining in primary production. Of course, the many constraints that continue to characterise the rural economy bite hard. It was therefore not surprising that the majority of rural households in our sample opted for income-generating activities that did not enjoy obvious economies of scale; indeed even those who risked operating OAEs chose labour-, rather than capital- or technology-intensive pursuits.

The recent China's entry into the WTO will surely accelerate the process of income source diversification and commercialisation already well under way in the countryside. Those rural households who resist diversification and persist with struggling on with only grain farming may well find their position becoming increasingly untenable. On the one hand, state-subsidised grain exports are not permitted under WTO rules and, on the other, it is no longer possible to protect the domestic market against low cost and high quality imports (Hua & Liu, 2002). To meet the challenges arising from stern competition and to maintain market share, Chinese farmers either have to adjust to market demand swiftly or will be dealt out of market. At the macro-level, the fundamental issue haunting rural China remains the existence of the vast numbers of underemployed "surplus" labour. In China, land is so scarce that, no matter how aggressive rural households diversify their income generating activities, the rural sector itself by no means can absorb fully and efficiently such amount of surplus labourers. Thus, moving rural surplus labour off-farm still has to depend on rural-urban migration. The good news is that the Chinese government has realised this serious issue and began relaxing the *hukou* system in order to allow rural-urban migrants settle down in cities. However, the issue will never be sorted out until the human migration-control obsessed *hukou* system is totally abolished.

Table 3.1 Basic statistics of the sampled rural households' income generating activities

	1	2	3	4	5
	AHs engaged exclusively in agriculture	DHs with agriculture and waged work	NAHs with only waged work	DHs with agriculture and running OAEs	NAHs only running OAEs
No. of observations	259	86	15	48	34
Means:					
HH[1] farming net income (Chinese yuan)	4624.22	4413.91		3909.04	
HH farming inputs (Chinese yuan)	4956.86	4386.79		3299.19	
HH farming capital (Chinese yuan)	3929.97	2891.06		3336.77	
Total no. of annual working days on farming	434.79	343.47		292.15	
No. of annual working days per labour on farming	208.00	140.50		124.87	
No. of male annual working days on farming	253.41	187.64		175.82	
No. of female annual working days on farming	201.20	184.78		169.15	
Land (Chinese *mu*)	17.63	15.62		12.17	
Annual working days per labour (total)	208.00	252.32	296.61	272.16	296.80
HH OAE net income (Chinese yuan)				8798.96	26711.76
HH OAE capital (Chinese yuan)				7514.58	27294.81
HH OAE hired labour (annual days)				24.38	67.94
Total no. of working days on HH OAE				316.77	576.76
No. of male annual working days on HH OAEs				210.43	360.94
No. of female annual working days on HH OAEs				212.04	366.36
Means of household Characteristics:					
HH heads' education (school years)	6.74	7.43	7.41	6.83	7.44
Average HH workers' education (school years)	6.73	7.19	7.36	6.90	7.64
HH Head age	39.23	40.26	38.76	42.54	37.68
No. of workers by HH	2.08	2.38	1.65	2.31	1.91
HH size	3.40	3.57	3.41	3.81	3.56
Dependency ratio[2]	0.694	0.580	1.225	0.802	1.108
Household Characteristics (%):					
Agricultural skills	0.77	12.79	0.00	6.25	2.94
Non-agricultural skills	5.02	22.09	26.67	18.75	35.29
Party member	5.02	20.93	6.67	12.50	5.88
Township or village leader residing at home	1.54	12.79	0.00	2.08	0.00
No. of each type of HHs in the Villages					
Village 1	37	4	2	4	3
Village 2	13	16	4	10	7
Village 3	39	3	0	2	3
Village 4	21	8	2	9	8
Village 5	26	5	3	7	8
Village 6	29	16	2	3	0
Village 7	36	11	0	3	0
Village 8	39	9	0	2	0
Village 9	19	14	2	8	5

Note:

1. HH denotes household.
2. Dependency ratio is defined as a ratio of no. of dependants to no. of workers by household.

Source: Derived from the Fieldwork Survey.

Table 3.1A The AHs and DHs' agricultural activities with and without cash crop products

	1	2	3	4
	AHs without cash crop production	AHs with cash crops	DHs agricultural activities without cash crops	DHs agricultural activities with cash crops
No. of observations	128	131	78	56
Means:				
HH* farming net income (Chinese *yuan*)	4174.91	5063.24	3307.66	5522.02
HH farming inputs (Chinese *yuan*)	5085.02	6148.43	3793.29	5682.57
Seeds, fertiliser, etc. (Chinese *yuan*)	2477.67	2143.85	1938.49	1939.50
Water and electricity (Chinese *yuan*)	800.73	219.85	500.56	85.57
Fuel (Chinese *yuan*)	343.05	97.63	302.31	143.75
Husbandry expenditure (Chinese *yuan*)	277.42	2927.79	100.13	2695.00
Machine maintenance (Chinese *yuan*)	418.58	75.00	386.03	79.107
Transportation (Chinese *yuan*)	55.30	63.47	43.72	65.45
Machine hiring (Chinese *yuan*)	712.27	620.84	522.06	674.20
HH farming capital (Chinese *yuan*)	3953.05	2590.61	2044.10	3051.43
Land (Chinese *Mu*)	18.46	16.81	13.85	15.14
No. of working days on HH farming	388.67	479.85	244.50	437.32
Mean No. of working days per labour p.a. on farming	192.137	224.86	107.947	172.44
No. of male annual working days on HH farming	224.95	280.78	132.92	244.13
No. of female annual working days on HH farming	182.95	219.14	137.06	226.71
Mean of household Characteristics:				
No. of school years of HH head	5.00	6.877	7.269	7.14
Average No. of school years of HH workers	6.59	6.858	7.155	6.98
HH Head age	45.00	39.25	40.73	41.55
No. of HH workers	2.03	2.137	2.24	2.517
HH size	3.35	3.45	3.615	3.71
Dependency ratio	0.73	0.655	0.69	0.61
Household Characteristics (%):				
Agricultural skills	0.78	0.76	8.97	12.50
Non-agricultural skills	3.91	6.11	23.08	17.86
Party member	5.47	4.58	23.08	10.71
Township or village leader at home	3.13	0.00	12.82	3.57
No. of each type of households in the Villages				
Village 1	19	18	7	1
Village 2	7	6	18	8
Village 3	33	6	4	1
Village 4	0	21	0	17
Village 5	18	8	11	1
Village 6	9	20	7	12
Village 7	2	34	3	11
Village 8	22	17	6	5
Village 9	18	1	22	0

Note: HH denotes household.
Source: Derived from the Fieldwork Survey.

Table 3.2.1 The application of the multinomial logit model of rural household choice of income-generating activities: the coefficients

	1	2
	HHs with waged workers or with both waged workers and agriculture	HHs running OAEs or with both OAEs and agriculture
Constant	-3.984	-2.321
	(2.98)***	(1.69)*
HH No. of school years of head	0.159	0.064
	(1.88)*	(0.70)
HH head experience	0.095	-0.087
	(1.25)	(1.29)
HH head experience squared	-0.002	0.001
	(1.19)	(1.34)
HH with agricultural skills	1.729	1.004
	(2.01)**	(1.06)
HH with non-agricultural skills	1.575	2.000
	(3.90)***	(4.64)***
HHs with a party member	0.532	0.483
	(0.90)	(0.77)
HHs with s village or township	1.511	-0.466
Leader at home	(1.71)*	(0.35)
No. of HH workers	0.558	1.019
	(1.90)*	(3.24)***
Dependency ratio	0.366	1.013
	(1.22)	(3.49)***
Village 1	-2.176	-2.042
	(3.37)***	(3.24)***
Village 3	-2.358	-2.361
	(3.47)***	(3.46)***
Village 4	-0.958	-0.180
	(1.63)*	(0.33)
Village 5	-1.423	-0.667
	(2.39)**	(1.21)
Village 6	-0.806	-2.876
	(1.46)	(3.68)***
Village 7	-1.596	-2.800
	(2.70)***	(3.64)***
Village 8	-1.550	-2.983
	(2.70)***	(3.51)***
Village 9	-0.384	-0.639
	(0.68)	(1.10)
Log-likelihood	**-342.9390**	
Restricted log-likelihood	**-428.5996**	
Pseudo R-squared	**0.1999**	
Number of observations	**444**	

	Predicted			
Actual	0	1	2	Total
0	228	16	15	259
1	54	37	12	103
2	42	12	28	82
Total	324	65	55	444

Notes:

1. *** = Significant at the 1% level; ** = Significant at 5%; * = Significant at 10%.
2. The t-ratios are in brackets.
3. HH denotes household.

Source: Derived from the Fieldwork Survey.

Table 3.2.2 The application of the multinomial logit model of rural household choice of income-generating activities: the marginal effects

	1	2	3
	HHs with only grain farming	HHs with wage workers or with both wage workers in OFAs and agriculture	HHs with wage workers or both running OAEs and agriculture
Constant	0.782	-0.625	-0.157
	(2.95)***	(2.41)**	(0.93)
HH No. of school years of head	-0.028	0.026	0.003
	(1.67)*	(1.73)*	(0.24)
HH head experience	-0.006	0.020	-0.014
	(0.41)	(1.44)	(1.62)
HH head experience squared	0.0001	-0.0003	0.0002
	(0.40)	(1.37)	(1.66)*
HHs with agricultural skills	-0.339	0.271	0.068
	(1.67)*	(2.02)**	(0.68)
HHs with non-agricultural skills	-0.409	0.210	0.198
	(4.02)***	(2.96)***	(3.14)***
HHs with a party member	-0.120	0.078	0.043
	(0.96)	(0.80)	(0.60)
HHs with a village or township	-0.173	0.282	-0.110
Leader at home	(0.82)	(1.88)*	(0.69)
No. HH workers	-0.173	0.064	0.109
	(2.76)***	(1.29)	(2.47)***
Dependency ratio	-0.145	0.030	0.115
	(2.38)**	(0.61)	(2.73)***
Village 1	0.498	-0.315	-0.183
	(3.66)***	(2.56)***	(2.18)**
Village 3	0.554	-0.336	-0.217
	(3.91)***	(2.55)***	(2.27)**
Village 4	0.153	-0.163	0.010
	(1.29)	(1.64)*	(0.16)
Village 5	0.264	-0.229	-0.036
	(2.18)**	(2.16)**	(0.57)
Village 6	0.380	-0.045	-0.335
	(2.89)***	(0.50)	(2.72)***
Village 7	0.485	-0.187	-0.298
	(3.54)***	(1.82)*	(2.56)***
Village 8	0.496	-0.173	-0.323
	(3.64)***	(1.71)*	(2.43)**
Village 9	0.114	-0.046	-0.067
	(0.97)	(0.51)	(1.00)

Notes:

1. *** = Significant at the 1% level; ** = Significant at 5%; * = Significant at 10%.
2. The t-ratios are in brackets.
3. HH denotes household.

Source: Derived from the Fieldwork Survey.

Table 3.2.3 The application of the multinomial logit model of rural household choice of income-generating activities: Simulated Probabilities

	1	2	3
	HHs with grain farming only	HHs with wage workers or with both wage workers and agriculture	HHs running OAEs or with both OAEs and agriculture
In possession of agricultural skills:			
"Yes"	28.12	54.40	17.47
"No"	63.66	21.85	14.49
In possession of non-agricultural skills:			
"Yes"	26.31	38.10	35.59
"No"	67.45	20.21	12.34
Party membership:			
"Yes"	50.95	30.34	18.71
"No"	63.45	22.18	14.37
With a township or village leader in the household:			
"Yes"	36.71	57.75	5.54
"No"	62.98	21.87	15.15
Village dummy variables			
Village 1	84.98	12.37	2.65
Village 2	39.62	50.85	9.53
Village 3	87.40	10.61	1.98
Village 4	59.06	29.07	11.87
Village 5	69.79	21.59	8.62
Village 6	63.03	36.11	0.85
Village 7	78.45	20.40	1.15
Village 8	77.85	21.20	0.95
Village 9	49.96	43.69	6.35

Notes:

1. Village 2 was defined as the default village.
2. HH denotes household.

Source: Derived from the Fieldwork Survey.

Table 3.3 Test of diversification variables in the agricultural production functions of AHs and DHs

	1	2	3	4
	AHs agriculture	DHs agriculture	AHs agriculture with cash crops	DHs agriculture with cash crops
Log (labour days)	0.401	0.182	0.240	0.176
	(4.69)***	(2.66)***	(2.08)**	(1.23)
Log (land)	0.465	0.651	0.295	0.362
	(5.46)***	(5.88)***	(2.57)***	(1.68)*
Log (capital)	0.033	0.006	0.002	-0.016
	(1.54)	(0.27)	(0.09)	(0.49)
Log (seeds, fertiliser, etc.)	-0.124	-0.161	-0.057	-0.258
	(2.50)***	(2.21)**	(1.17)	(2.04)**
Log (water and electricity)	0.023	-0.010	0.038	0.148
	(1.12)	(0.31)	(1.56)	(2.44)**
Log (fuel)	0.046	0.042	0.032	-0.002
	(2.52)***	(1.48)	(1.39)	(0.05)
Log (husbandry expenditure)	0.054	0.031	0.026	0.075
	(4.63)***	(1.71)*	(2.09)**	(3.01)***
Log (machine maintenance)	0.018	0.005	0.043	0.030
	(1.01)	(0.23)	(1.66)*	(0.80)
Log (transportation)	0.045	-0.019	0.027	0.064
	(2.53)***	(0.68)	(1.15)	(1.23)
Log (machine hiring)	-0.034	-0.015	-0.008	-0.054
	(1.53)	(0.44)	(0.27)	(0.83)
HH head experience (years)	-0.0014	-0.0282	0.0225	0.0734
	(0.11)	(1.11)	(1.71)*	(1.33)
HH head experience	0.0000	0.0005	-0.0003	-0.0012
squared-term	(0.12)	(1.19)	(1.31)	(1.18)
HH head school years	0.031	0.037	0.028	0.099
	(1.67)*	(1.55)	(1.19)	(2.62)***
Cash crops (dummy	0.235	0.228		
variable)	(2.92)***	(1.76)*		
Ratio of cash crops to total			1.057	0.543
agricultural output			(5.97)***	(1.61)
Village 1	-0.968	-0.966	-1.055	-0.190
	(5.78)***	(3.65)***	(5.19)***	(0.28)
Village 3	-0.509	-0.124	-0.877	-0.637
	(2.95)***	(0.45)	(3.62)***	(0.98)
Village 4	-0.525	-0.501	-1.139	0.278
	(2.29)**	(1.83)*	(4.29)***	(0.58)
Village 5	-0.468	-0.382	-0.654	-0.144
	(2.74)***	(1.95)**	(2.96)***	(0.23)
Village 6	-1.193	-1.220	-1.204	-0.163
	(5.37)***	(4.32)***	(4.41)***	(0.35)
Village 7	-1.003	-1.018	-1.111	0.0143
	(4.42)***	(3.44)***	(4.18)***	(0.03)
Village 8	-1.271	-1.310	-1.138	0.002
	(5.72)***	(4.24)***	(4.23)***	(0.00)
Village 9	-0.798	-0.611	-0.616	n.a.
	(4.34)***	(3.46)***	(1.44)	
Constant	6.321	8.033	7.005	6.739
	(11.48)***	(15.39)***	(10.10)***	(7.02)***
No. of observations	259	134	131	56
Adjusted R-squared	0.58	0.55	0.63	0.52
Standard error	0.20	0.20	0.15	0.21

Notes:

1. *** = Significant at the 1% level; **= Significant at 5%; *= Significant at 10%.
2. The t-ratios are in brackets.
3. HH denotes household.
4. The production functions of DHs agriculture and AHs agriculture with cash crops were estimated with robust approach due to the existence of heteroscedasticity.

Source: Derived from the Fieldwork Survey.

Table 3.4 The household production functions

	1	2	3	4	5	6
	AHs' agriculture without cash crops	AHs' agriculture with cash crops (Robust)	DHs agriculture without cash crops	DHs agriculture with cash crops	DHs running OAEs	NAHs OAEs (2 stage OLS)
Log (labour days)	0.219	0.420	0.136	0.281	0.530	0.825
	(2.02)**	(3.36)***	(1.97)**	(2.14)**	(2.55)**	(1.66)
Log (land)	0.657	-0.121	0.584	0.279		
	(5.28)***	(1.03)	(5.18)***	(1.30)		
Log (capital)	0.041	0.025	0.0101	-0.033	0.053	0.028
	(1.55)	(0.89)	(0.42)	(0.99)	(1.49)	(0.37)
Log (hired labour days)					0.139	0.155
					(2.50)**	(2.54)**
Log (seeds, fertiliser, etc.)	0.028	0.081	0.155	-0.274		
	(0.24)	(1.48)	(1.60)	(2.12)**		
Log (water and electricity)	0.044	0.032	-0.024	0.140		
	(1.52)	(1.18)	(0.64)	(2.26)**		
Log (fuel)	0.050	0.036	0.033	-0.001		
	(2.04)**	(1.42)	(0.90)	(0.02)		
Log (husbandry expenditure)	0.055	0.031	-0.021	0.080		
	(2.98)***	(2.29)**	(0.73)	(3.19)***		
Log (machine maintenance)	0.007	0.024	0.010	0.026		
	(0.34)	(0.88)	(0.46)	(0.66)		
Log (transportation)	0.008	0.039	-0.026	0.052		
	(0.39)	(1.48)	(0.99)	(0.99)		
Log (machine hiring)	0.030	-0.022	-0.037	-0.059		
	(1.02)	(0.68)	(1.15)	(0.89)		
HH head experience(years)	-0.023	0.029	-0.022	0.082	-0.018	0.060
	(1.05)	(2.00)**	(0.77)	(1.47)	(0.33)	(1.06)
HH head experience squared-term	0.0004	-0.0004	0.0004	-0.001	0.000	-0.001
	(1.09)	(1.60)	(0.88)	(1.35)	(0.31)	(0.89)
HH head school years	0.0205	0.0239	0.005	0.096	0.085	0.150
	(0.97)	(0.94)	(0.21)	(2.49)**	(1.47)	(1.60)
Village 1	-1.017	-1.070	-1.015	-0.464	-0.866	-0.361
	(4.98)***	(4.78)***	(4.32)***	(0.70)	(2.02)**	(0.60)
Village 3	-0.373	-0.804	-0.397	-0.594	-0.456	-1.426
	(1.73)*	(3.01)***	(1.52)	(0.89)	(0.85)	(1.83)*
Village 4	n.a.	-0.908	n.a.	0.357	-0.865	-0.883
		(3.14)***		(0.74)	(2.73)***	(1.67)
Village 5	-0.338	-0.827	-0.274	-0.258	-0.015	0.402
	(1.58)	(3.37)***	(1.58)	(0.41)	(0.04)	(1.26)
Village 6	-0.961	-1.083	-1.379	-0.230	-1.242	n.a.
	(3.63)***	(3.58)***	(4.06)***	(0.48)	(2.23)**	
Village 7	-0.281	-0.930	-0.798	0.033	-0.459	n.a.
	(0.76)	(3.15)***	(2.14)**	(0.06)	(0.87)	
Village 8	-1.236	-1.250	-1.400	-0.150	-1.028	n.a.
	(4.59)***	(4.20)***	(4.15)***	(0.25)	(1.65)	
Village 9	-0.827	-0.183	-0.877	n.a.	-0.749	-0.815
	(4.16)***	(0.39)	(5.25)***		(2.17)**	(1.62)
Constant	5.543	6.129	6.612	6.800	5.506	2.587
	(7.62)***	(8.01)***	(9.08)***	(6.93)***	(3.97)***	(1.15)
No. of observations	128	131	78	56	47	34
Adjusted R-squared	0.75	0.54	0.72	0.49	0.52	0.47
Standard error	0.14	0.18	0.13	0.22	0.43	0.33
Returns to scale	1.139	0.545	0.8201	0.491	0.722	1.008

Notes:

1. *** = Significant at the 1% level; **= Significant at 5%; *= Significant at 10%.
2. The t-ratios are in brackets.
3. HH denotes household.

Source: Derived from the Fieldwork Survey.

Table 3.4A Marginal Products

	1	2	3	4	5	7
	AHs' agriculture without cash crops	AHs' agriculture with cash crops	DHs' agriculture without cash crops	DHs' agriculture with cash crops	DHs' OAEs	NAHs' OAEs
Marginal Products						
Labour (daily)	2.39	4.91	3.73	8.03	18.72	44.44
Labour (hourly)	0.30	0.61	0.47	1.00	2.34	5.56
Hired labour (days)	n.a.	n.a.	n.a.	n.a.	20.72	27.16
Capital (yuan)	0.23	0.15	0.16	-0.22	0.14	0.05
Land (mu)	179.55	-60.52	241.83	21.75	n.a.	n.a.
Average Net Products						
AP-Labour (daily)	10.91	11.70	27.46	28.58	35.32	53.87
AP-Labour (hourly)	1.36	1.46	3.43	3.57	4.42	6.73
Hired labour (days)	n.a.	n.a.	n.a.	n.a.	149.03	175.25
AP-Capital	5.72	6.05	15.39	6.52	2.65	1.96
AP-Land	273.29	500.19	414.09	77.94	n.a.	n.a.

Notes:

1. The marginal products were derived from the production functions presented (Table 3) and the average products in this table.
2. AP denotes average product.
3. HH denotes household.

Source: Derived from the Fieldwork Survey.

Chapter 4

ESTIMATION OF CHINESE RURAL LABOUR PARTICIPATION AND SUPPLY WITH SHADOW WAGES

4.1 Introduction

Unlike in developed countries, labour participation and supply behaviour in the developing world, especially its rural areas, has been under-researched. A good example is rural China, where about five hundred million labourers live and work, but up to now, to my knowledge there has not been any published study on this issue. The main obstacles to conduct this kind of study are that rural labour markets are incomplete or even barely exist, with the majority of the rural labour force working on their own farms or family enterprises instead of in the market. Hence, market wage rates are not available to most of rural workers. Without them, modelling households or individuals' time allocation seems very difficult. One notable study on this issue was made by Rosenzweig (1980), who applied the neoclassical family labour model to rural India by imputing wage rates from labour market participants to the self-employed on the assumption that rural Indian labour markets are efficient, free of transaction costs and with perfect substitution between family and hired labour. However, it is hard to apply this method to some developing areas, such as rural China, where most of rural households do not hire out or hire in labour but have

their own labour working exclusively on their own farms. Fortunately, this methodological obstacle has been cleared by Jacoby (1993), who developed a general methodology for estimating structural time-allocation models for agricultural households whose members don't work for wages, and applied it to rural Peru. The key to Jacoby's approach is to estimate the opportunity cost of time, or 'shadow wage' which is determined from within the household, rather than by markets. Using Jacoby approach, Skoufias (1994) estimated the labour supply behaviour of rural Indian agricultural households.

Both Jacoby and Skoufias's studies were only concerned with labour supply behaviour of agricultural households. However, some of the households in our rural survey have extensively diversified their income sources into non-farm activities, such as local non-farm wage employment, out-migrating and running own account enterprises (OAEs).

To get a complete analysis of rural labour supply behaviour, not only does one have to include rural labours engaged in all categories of income generating activities but also one has to consider those of working age not working for income. In other words, it is necessary to incorporate labour participation behaviour into labour supply. As a matter of fact, in our randomly selected rural household samples, all male household labourers in working age reported working, but nevertheless 13 percent of females in working age did not work for income at all.

The chapter is organised as before, i.e. theoretical discussion, data, econometric model specification, econometric estimation results, and summary.

4.2 Theoretical framework: rural agricultural households and their labour participation and supply

In order not to divert our focus from modelling rural labour participation and labour supply behaviour by entering into the extensive debates on the intra-household model, we simply adopt the 'agricultural household model' (Singh, Squire & Strauss, 1986: 6; Bardhan & Udry, 1999: 7-11). In rural China or other developing countries, the agricultural household - with its workers exclusively working on its own farm and no hired labour - functions as a family enterprise. Its income is the outcome of the family's collective effort such as decision making, management, labour, etc. Within the household, how much a working member should work and s/he can earn couldn't fully be explained by her/his own human capital, because at surface it is decided by the entire household's decision making, management level, etc., and it is profoundly determined by the household production function. It should also be noted that the nature of subsistence farming and underemployment in populous developing countries could influence rural labour participation and labour supply behaviour by making people be less likely to sacrifice potential income in order to enjoy leisure than are the people living in the developed world. Finally, as in the canonical agricultural household model, it is assumed here that a rural household acts as if it possesses and maximises a twice differential utility function decided jointly by the husband and wife:

(1) $U = U(l_m, l_f, C)$

where l_m *and* l_f denote the amount of time spent in non-income generating activities in a certain time interval by male and female household members respectively, such as leisure or home production; C denotes budget constraint or consumption constraint that includes market goods and home produced goods. Each household member's total time T_k ($k = m, f$) is allocated between non-income generating activities (l_k; $k = m, f$) and income generating

activities (self-employed work either on own farm or in family business) (L_k; k=m, f). In addition, the rural household might have hired labour (H_k; k=m, f) in its household income-generating activities either agricultural or non-agricultural.

Now that household utility function has been established, we try to model the most typical rural households with all household members working on own farm and no hired labourers. Actually the majority of Chinese rural households in the region of interest are of this type. In this case, a household's preference over leisure and consumption enters into the own-farm labour demand decision, in other words, the household's labour supplies are determined by agricultural technology (Jacoby, 1993). Besides, we assume that the household's production function of agriculture as Equation (2) displayed is strictly concave.

(2) $Y = F(L_m, L_f, I)$

where Y denotes agricultural output, L_m *and* $L_f$denote the amount of time spent in income generating activities in a certain time interval by male and female household members respectively, I represents a vector of other productive inputs like equipment, land, draft animals, fertiliser, seeds, etc. As we have assumed that own farm shadow wage rate $\hat{w}_k$ be equal to a household member k's marginal product i.e. MP_{l_k} resulted from households' maximum output, and shadow wage rates of prime age male and female needn't be same. This would lead to a non-linear budget constraint in term of hours worked. To overcome this difficulty, we follow Jacoby (1993) by adopting Hall's [36] (1973) approach of linearizing the budget constraint at the point of $\hat{w}_k$ where the household profit

[36] Progressive tax on income leads to non-linear budget constraint (quasi-concave to the origin) for the working households in term of hours worked. However, given strictly convex indifference curves, the equilibrium tangency point of the non-linear budget constraint and the convex indifference curve would be unique. Hall (1973) suggested that the non-linear budget constraint could be linearized at the tangency point (Berndt, 1991, p. 929-631).

maximization is reached. Therefore, the household budget constraint could be laid out as follows:

$$(3)\ C = \hat{\pi} + \hat{w}_m L_m + \hat{w}_f L_f + V$$

where $\hat{\pi}$ is the profit generated from own-farm or family business with the opportunity cost of family labour deducted, V is other non-labour or property income.

Under this circumstance, the maximization of utility equation (1) subject to the budget constraint equation (3) leads to Lagrange function:

$$Lagrange(l_m, l_f, \hat{w}_k, C) = U(l_m, l_f, C) - \lambda[C - (\hat{\pi} + \hat{w}_m L_m + \hat{w}_f L_f + V)]$$

$$\frac{\partial Lagrange}{\partial l_k} = \frac{\partial U}{\partial l_k} - \lambda \hat{w}_k = 0 \text{, due to that } l_k = T_k - L_k$$

$$\frac{\partial Lagrange}{\partial C} = \frac{\partial U}{\partial C} - \lambda = 0$$

$$(4)\ \frac{\partial U}{\partial l_k} \Big/ \frac{\partial U}{\partial C} = \hat{w}_k$$

Equation (4) says that, if both the household members work on their own farm or family business only, the male or female member's marginal rate of substitution of consumption for leisure is equal to its shadow wage rate $\hat{w}_k$ or his/her marginal product of labour from the household farming. Consequently, a working household member's shadow wage rate

$\hat{w}_k$ is also his/her opportunity cost or price of leisure. Moreover, if a working family member's reservation wage rate w_r is higher than his/her shadow wage rate $\hat{w}_k$, s/he would not participate in family income-generating activities. In other words, his/her utility maximization problem reaches a corner solution instead of an interior one.

Therefore, a family member's leisure demand function should be formulated as follows:

$$(5)\, l_k = l_k(\hat{w}_m, \hat{w}_f, V) \qquad (k = m, f)$$

where V denotes non-labour income or property incomes.

Since $L_k = T_k - l_k$, the corresponding labour supply function can be written as:

$$(6)\, L_k = L_k(\hat{w}_m, \hat{w}_f, V) \qquad (k = m, f)$$

From Equation (6), questions to be enquired naturally are that how the change of wage rate and non-labour income affect labour supply respectively. Firstly, we look at pure income effect, i.e. how a unit-increase of non-labour income will affect labour supply. We suppose that leisure in Equation (5) is a normal good, which means that an increase of non-labour income will result in consumers taking more leisure. In other words, the pure income effect on labour supply is negative.

Now we turn to wage effect, for which the well-known Slutsky equation provides a solution. Due to the duality that exists between the Marshallian and Hicksian form of leisure demand function, i.e.

(7) $l_k^h(\hat{w}_m, \hat{w}_f, U^*) = l_k(\hat{w}_m, \hat{w}_f, V)$ (Jehle & Reny, 2001: 43). Then the Slutsky equation of leisure demand can be derived as:

$$(8)\ \frac{\partial l_k}{\partial \hat{w}_j} = \frac{\partial l_k^h}{\partial \hat{w}_j} - l_j \frac{\partial l_k}{\partial V} \qquad (k = m, f) \text{ and } (j = m, f)$$

where the first term on the right hand side of Equation (8) is the substitution effect of wage increase, the second term is the income effect of wage increase. If k is equal to j, then the first term of the right hand side is the own wage substitution effect; otherwise, it is the cross wage substitution effect. As we have supposed that leisure is a normal good, according to the Slutsky theorem, own wage substitution effects on leisure must be negative (Jehle & Reny, 2001: 51-53), whereas the income effect on leisure should be positive. Due to the fact that $l_k \equiv T_k - L_k$, correspondingly the own wage substitution effect on labour supply is positive, whereas the income effect on labour supply is negative. So the uncompensated wage effect on labour supplies i.e. $\partial L_k / \partial w_k$ could be of either sign. The decline in average hours worked together with increased real wage observed in the developed world during the twentieth century has been viewed as evidence that the income effect of wage increases has dominated the substitution effect (Sapsford & Tzannatos, 1993: 27). However, due to the existence of enormous amount of surplus labour and underemployment in rural China, we wouldn't expect this particular phenomenon to happen there as well. Additionally, by theory, male and females' cross substitution elasticity should be equal because the Slutsky matrix is symmetric. So we are going to test whether this theoretical hypothesis is refused in rural China.

One more point that has to be made clear is that, if the separation property of the agricultural household model does not hold, a household's production, consumption and

labour supply decisions are jointly decided (Bardhan & Udry, 1999: 11), then shadow wages, labour supplies, consumption and income are endogenous (Jacoby, 1993). In the case of subsistence farming, these decisions are made simultaneously. However, a large part of agriculture is made up of semi-commercial farms in which some inputs are purchased and some output are sold. In these circumstances, producer, consumer and labour supply decisions are no longer made simultaneously, although they are obviously connected because the market value of consumption can not exceed the market value of production less the market value of inputs (Singh, Squire & Strauss, 1986: 6).

The above theoretical discussion about labour participation and supply in an agricultural household model with their labour working exclusively on household farming can easily be applied to rural households of other kinds such as those running family non-agricultural business even with hired labour. The key is to derive the shadow wage rate. An extreme case is that all the members of some rural households might work exclusively for wages. In this case, rural labour supply can be fully explained by the neo-classical labour supply theory.

Clearly, the implicit assumption of our theoretical framework is a unitary model of the household, which argued that a family is supposed to pool all its income and hence to maximize utility from total family consumption and their members' leisure subject to a family budget constraint (Ashenfelter & Heckman, 1974). The unitary model had been criticised as assuming the family decision making process like 'a black box', more fundamentally as not being built on individualism – the core of the neoclassical microeconomics (Chiappori, 1992), and as being unable to explain intra-household inequalities. To overcome these drawbacks, a collective model is proposed, which supposes that members of a family share non-labour income according to some given rules,

and that each family member is characterised by specific preferences and hence optimally chooses his/her own consumption and labour supply (Chiappori, 1992). However, the purpose of this chapter is to analyse Chinese rural labour participation and labour supply behaviour rather than to test whether the unitary or collective hypothesis is more appropriate in explaining family labour supply decision. Besides, the collective model has not been generalised to incorporate the case of non-working family members, namely, a corner solution (Fortin & Lacroix, 1997) which is central in explaining labour participation behaviour in this chapter. Finally, as a matter of fact, our data is unsuitable to test these two models in the sense that the data does not distinguish property income of the husband from the wife, which are the critical variables in testing whether the assumption of pooling family resources is correct (Schultz, 1990; Fortin & Lacroix, 1997). Due to these constraints, the unitary model is still used as a theoretical base of this chapter following Singh, Squire & Strauss (1986: 6), Jacoby (1993), and Bardhan & Udry (1999: 7-11). Nevertheless, this doesn't mean that nothing can be done about the collective model. For example, some of the assumptions of the unitary model can be tested, such as the Slutsky symmetry of compensated cross wage effect restriction and the non-negativity of the determinant of the Slutsky matrix. If these assumptions of the unitary model were rejected, we can add to the evidence in the existing empirical literature against the unitary model (for example, Schultz, 1990; Fortin & Lacroix, 1997).

4.3 Data and econometric model specification

4.3.1 Data

As we have given in Chapter 1 the detailed description of the fieldwork – a survey of 450 rural households conducted by the author in a clustering of nine villages scattered across Xinmin County of Liaoning Province of the northeast China in 1998, here only the relevant specification and variables are presented.

Tables 3.1, 3.1A & 4.1 present the data in summary form. As we have said in Section 4.1 that the shadow wages or marginal products of household workers have to be estimated and computed from household production functions, we briefly introduce the types of households of our sample in the first place. Tables 3.1 & 3.1A present the relevant data in detail. Altogether 450 rural households were surveyed.[37] We were able to distinguish three main categories of income-generating households (see Section 1.4 of Chapter 1).

As to our major concern, i.e. rural male and female labour supply, Table 4.1 reports the data in detail. The initial classification reveals that 523 males and 488 females are of working age. All the 523 males were reported working; 338 or 64.63% in household farming; 185 or 35.37% in OFAs. Of the 488 females, 62 or 12.70% reported not working at all, 335 or 68.65% in household farming, 91 or 18.65% in OFAs. Both male and female workers supply less labour (counted as mean of annual working days) in household farming than in OFAs; that of males' are 221.75 and 309.45 days respectively; that of females' 190.17 and 298.18 days in that order. Besides, both male and female workers in household farming have about one year less education than those in OFAs.

4.3.2 Econometric model specification

[37] Eight of the sample households were excluded as six did not engage in any productive activity whatever due to the elderly age composition, and two depended entirely upon farm labouring.

A general model of labour participation and supply. In Section 4.2 we derived labour participation and labour supply model of agricultural households with their labour working on own farm or non-farm OAEs. In this section, our task is to specify the estimable econometric model for rural labour participation and labour supply. Let's suppose a specific utility function for rural workers:

$$(9)\ U = [\hat{w}_k(L_k + e) + V]^{\alpha}[1 - (L_k + e)]^{\beta}$$

where a rural worker's total time T_k is normalised to 1 so that L_k is the proportion of time spent on income work, $\hat{w}_k$ denotes shadow wage rate, e is an unobserved error term varying among different individuals, V includes the family's property or non-labour income, and the term in the first bracket of the right hand side is disposable consumption budget C, and finally the term in the second bracket is the proportion of time in leisure (non-market activities). Thus, a working household member k's marginal rate of substitution of consumption for leisure, i.e. MRS_k is:

$$(10)\ MRS_k = \frac{\partial U}{\partial l_k} \Big/ \frac{\partial U}{\partial C} = [b/(1-b)][\hat{w}_k(L_k + e) + V]/[1 - (L_k + e)]$$

where $b = \beta/(\alpha + \beta)$, $l_k = 1 - (L_k + e)$. Now, if labour supply L_k is zero and hence leisure l_k is 1, the MRS_k or reservation wage rate (see Section 4 about the definition of MRS_k) is computed from Equation (10) as follows:

$$(11)\ w_r = [b/(1-b)](\hat{w}_k e + V)/(1-e)$$

If a rural household worker's shadow wage rate were greater than his/her reservation wage rate, i.e. $\hat{w}_k > w_r$, s/he would work for income or *interior solution* is reached; otherwise, s/he would stay away or labour participation decision is made at *corner solution*[38] optimally (so called 'corner equilibrium') (Killingsworth, 1983: 7). By setting $\hat{w}_k > w_r$ and rearranging implies $L_k > 0$ if and only if $\varepsilon_L > -J$, where $\varepsilon_L = -e$ and $J = (1-b) - b\frac{V}{\hat{w}_k}$ (when setting $MRS_k = \hat{w}_k$ in Equation (10), the equation about J can be derived). Hence we got the following equations:

(12) $L_k > 0$ if and only if $\varepsilon_L > -J$

(13) $L_k = 0$ if and only if $\varepsilon_L \leq -J$

where

(14) $\varepsilon_L = -e$ and $J = (1-b) - b\frac{V}{\hat{w}_k}$

If $L_k > 0$, labour supply equation can be derived by setting $MRS_k = \hat{w}_k$ in Equation (10) as follows:

(15) $L_k = (1-b) - b\frac{V}{\hat{w}_k} + \varepsilon_L$

By incorporating Equations (12), (13) and (15) together, the second generation's labour supply model is at hand (Berndt, 1991: 617-18). To make this labour supply model work, the following assumptions are necessary. Firstly, wage rates are assumed to be available to both workers and non-workers. Secondly, ε_L has a zero mean and a standard deviation of σ_L, and is normally distributed. This means that the standardized normal variable ε_L/σ_L has a mean zero and a variance of 1. Up to now, it is clear that the labour

[38] The corner solution is to distinguish those unwilling to work because their would-be wage rate had they worked less than their reservation wage rate and those who cannot find a job even they accept the minimum wage rate. For the later case, there isn't a solution, let alone a corner solution.

supply model can be estimated empirically either by the well-known Heckman two-step procedure or by the Tobit model. When people do not work because $\hat{w}_k < w_r$ or labour participation decisions are optimal at corner solution, theoretically there is no difference between the Heckman procedure and Tobit model in estimating labour supply behaviour. However, empirically they are different by virtue of the fact that the Heckman probit procedure does not restrict the two sets of explanatory variables in probit for labour participation decisions and linear regression of labour supply to be the same, whereas the Tobit does.

Labour participation and supply models and relevant variables. In our rural household survey data, except for the few incapable of working, all males of working age reported working, thus there isn't a labour participation problem worth modelling for them. However, 13 percent of the females in working age reported not working for income at all. In this case, the above standardised econometric model can be deployed to analyse labour participation and labour supply behaviour (the Heckman model is chosen because it is more flexible). In the first stage of Heckman procedure, labour participation is analysed by the probit model as follows:

(16) $z^* = \gamma' W + u_i$ where $Z = 1$ denotes working for income, 0 otherwise; and $u_i \sim N(0,1)$

$$\Pr(z_i = 1) = \Pr(z_i^* > 0) = \Phi(\gamma' W_i)$$

where W_i is a vector of explanatory variables, Φ denotes the normal distribution function, and γ a vector of associated coefficients. In the second stage of the model, the results of the probit are used to construct Mill's inverse ratios, λ_i. The labour supply function corrected by sample selection would then be derived as follows:

(17) E[L_i | L_i is observed] $= E[L \mid z^* > 0]$

$$
\begin{aligned}
&= E[L \mid u_i < \gamma' w] \\
&= \beta' X + E[\varepsilon_i \mid \mu_i < \gamma' w] \\
&= \beta' X + \rho\sigma_\varepsilon \lambda_i(\alpha_\mu) \\
&= \beta' X + \beta_\lambda \lambda_i(\alpha_\mu)
\end{aligned}
$$

where

$$\alpha_u = \gamma' w / \sigma_u$$
$$\lambda(\alpha_u) = \phi(\gamma' w / \alpha_u) / \Phi(\gamma' w / \sigma_u)$$

Therefore, the female labour supply function would be:

(18) $L \mid z^* > 0 = E[L \mid z^* > 0] + v_i = \beta' X + \beta_\lambda \lambda(\alpha_\mu) + v_i$ (Greene, 1997(a): 997), where v is an error term.

To correct selectivity for female labour supply function, we empirically identified an instrument variable 'having a village or township leader in the household' which affects female labour participation but not their labour supply. The coefficient of the variable in the probit analysis of female labour participation is statistically significant at 5% and of a positive sign, suggesting that having a leader in the household encourages females to work for income. In the female labour supply function, the selectivity variable generated by the Heckman procedure[39] is marginally significant at the 7% level (Table 4.4). It suggests that there is a positive relation between those unobserved factors affecting female labour participation and those determining how much they work.

Apart from the sample selectivity problem, two other practical obstacles still stand in the way of estimating rural female labour supply. One is whether a corner solution is reached or whether not working is due to the unavailability of work. The other is that wage

[39] The first step of the full Heckman two step estimation results is reported in Table 4.3.

rates are not available to non-workers. However, in rural China's case, it seems that these two obstacles do not exist. Firstly, in rural China, arable land is collectively owned by villagers of each village and is distributed on a generally equitable basis between cultivating households according to either household size or numbers of household members of working age registered in each village. In principle, therefore, every household member can work on their own farm if they wish. A relevant inference is that difference in labour supply cannot be explained by a household's land quantity at least in the same village. Moreover, labour is in shortage in agricultural peak times. So, if a female does not work for income at all, it is because the wage or shadow wage she would get had she worked is less than her reservation wage. Therefore, unavailability of work cannot explain why females in the samples are not working. In other words, our model of labour participation is not disturbed by the problem of involuntary unemployment.

Secondly, the shadow wage rates for those exclusively working on their own farm or own OAE are generated by their marginal products of labour. The latter can be estimated from their household production functions. For those specialised in waged OFAs, their wage rates are decided by market. For those involved in two or more two income generating activities (diversified between household farming and waged OFA, or between household farming and non-farm OAE, or even between household farming and waged OFA and waged farming job), their shadow wage or wage rates were based on the marginal product of labour or wage rate in the activity to which they supply the majority of their labour (Jacoby, 1993). For those non-working females, their wage rates can be simulated by their village's estimated marginal product of female labour providing their households are engaged in these activities. For those non-working females whose households do not have any farming or family OAE, their shadow wage rates can be imputed as the mean of the female shadow wage rates of their village.

Profit from either household agriculture or household OAEs could act as property or non-labour income in the labour supply function, but for households without these kinds of economic activities, for example, when all household workers are wage earners, their non-labour income would be zero. Shadow wage and property income derived like this suffer from a potential endogeneity problem. To address this, we use instrument model to treat it (details and results will be explained in Section 4.5).

In addition to shadow wages and property income, explanatory variables should also include education, experience (defined as potential working experience after finishing full-time education) and its quadratic term, health indicator and location dummy variables. To be in the line of the mainstream female labour participation and supply studies, the number of children aged less than seven and number of children aged seven to eighteen should also be included.

Finally, it should be stressed that like other populous developing countries, rural China is suffering from an enormous amount of surplus labour or disguised unemployment. Chinese official statistics report that there were 452.88 million rural residents of working age in the year of 2000. However, currently the agricultural sector only employs 322.6 million rural workers (State Statistic Bureau, 2001). The rest of them have to find living off-farm either locally or by rural-urban migration. At a microeconomic level, previous studies (Knight & Song, 1997; Cook, 1999; Song, 2000) and Chapter 3 of this thesis have shown that the returns to labour in non-farm activities were much higher than those in household farming were. This microeconomic evidence suggests that there is still pressure for Chinese rural labourers to go off-farm. The existence of rural surplus labour on a large scale would definitely affect rural labour supply behaviour. To a certain extent, rural labour supply is constrained by the demand side rather than by the supply side, at least for those only engaged in household farming.

Empirical labour supply function. The empirical function used in estimating rural labour supply is as follows:

(19) $LnL_k = \beta_0 + \beta_m \hat{w}_m + \beta_f \hat{w}_f + \beta_V V + \beta_z Z + \delta\lambda + v_i$

where $\beta's$ are the coefficients to be estimated, V denotes property income, Z other explanatory variables like education, experience, etc., λ is the sample selectivity correction term as explained above, and finally v is the error term. This functional form is different from the conventional ones (Killingsworth, 1983: 160) in the following respects. Firstly, the labour supply we use is measured by hours worked per year, because in the region of interest, the agricultural cycle is completed yearly. Secondly, the labour supply variable is in logarithmic form, which is mainly for convenience of explaining non-financial variables such education, experience, etc. Thirdly, shadow wage rates and property or non-labour incomes (i.e. farm or non-farm OAE profit after labour cost deducted (Jacoby, 1993)) cannot be put in logarithmic form due to the existence of some negative values. This is because some households got negative profit. However, these modifications lead to some changes of the computation of structural income and substitution effects as exhibited below.

Uncompensated wage elasticity. The male gross or 'uncompensated' wage elasticity of labour supply $(\partial L/\partial w)/(L/w)$ in our case could be derived by partial differentiating Equation (19) with respect to men's wage $\hat{w}_m$, and then the uncompensated wage elasticity can be computed as:

$$(20)\ \frac{\partial L}{\partial \hat{w}_m}\frac{\hat{w}_m}{L} = \beta_m \hat{w}_m$$

Women's uncompensated wage elasticity can computed along the same lines.

Property income elasticity. The property income elasticity is $(\partial L/\partial V)V/L$. In the same way with uncompensated wage elasticity, the property income elasticity in our case should be:

$$(21)\ \frac{\partial L}{\partial V}\frac{V}{L} = \beta_V V$$

Own and cross substitution effect. Regarding the Slutsky equation of labour supply, Killingsworth (1983: 106) defined it as:

$$(22)\frac{\partial L_k}{\partial \hat{w}_j} = S_{\hat{w}_j}(L_k) + L_j(\frac{\partial L_k}{\partial V}),\ k=m, f;\ j=m, f.$$

The substitution effect $S_{w_j}(L_k)$ can be computed as the difference between the total wage effect $\partial L_k/\partial \hat{w}_j$ and the income effect $L_j(\partial L_k/\partial V)$. The total wage effect and income effect is computed by partial differentiating Equation (19) with respect to $\hat{w}_j$ and V (property or non-labour income) respectively. When k is equal to j, it is the own wage substitution effect; otherwise it is the cross wage substitution effect. In our case, males and females' own and cross wage substitution elasticity should be as follows:

$$(23)\ S_{w_m}(L_m)\frac{w_m}{L_m} = (\beta_m - \beta_V L_m)w_m$$

$$(24)\ S_{w_f}(L_f)\frac{w_f}{L_f} = (\beta_f - \beta_V L_f)w_f$$

$$(25)\ S_{w_f}(L_m)\frac{w_f}{L_m} = (\beta_f - \beta_V L_f)w_f$$

$$(26)\ S_{w_m}(L_f)\frac{w_m}{L_f} = (\beta_m - \beta_V L_m)w_f$$

4.4 Derivation of shadow wage rates for rural male and female labour

To derive shadow wages for rural labourers working either on their own farm or in their family non-farm business, not only does one have to estimate their household production functions in the first place but also male and female labour input should be regarded as different inputs. In terms of income generating activities, there are six different types of households in our rural household samples: the AHs and DHs engaged in conventional grain farming only, the AHs and DHs diversifying between grain farming and cash crops, the DHs and NAHs engaged in non-agricultural OAE production. It should be expected that rural households engaged in different types of income generating activities have different production functions. Indeed, it was discovered in Chapter 3 that the production functions of AHs and DHs' agricultural activities with and without cash products cannot be pooled together, and thus we estimated them separately. Rather than pooling all rural households together and getting a single estimated production function, estimating household production functions separately by the different types of income generating activities should reflect the reality of rural economy more accurately. By this

logic, production functions were also estimated for DHs and the NAHs' non-agricultural OAE activities separately.

Functional form choice. We adopted the Cobb-Douglas form for estimating AHs and DHs' agricultural production functions. The reasons for this are as follows. For the sub-sample of DHs' agricultural production with or without cash crops, the number of observations was less than the number of explanatory variables (88) that the Translog form of production function requires. For AHs' agricultural production function with or without cash crops products, although the number of observations is somewhat larger, the small number of degrees of freedom is problematic.

For the DHs and NAHs' OAE production functions, F tests could not reject the null hypothesis of a Cobb-Douglas model. Thus, the Cobb-Douglas functional form is also employed for them.

Heteroscedasticity. Except for NAHs' OAEs, Cook-Weisberg (STATA 7 Reference, v. 3: 107) test results cannot reject the null hypothesis of no heteroscedasticity in the other five production functions. Thus, for NAHs' OAEs production function we use White's heteroscedastic-consistent stand error.

Goodness of Fit. The goodness of fit measured by the adjusted R-squared statistics for the AHs and DHs' agricultural production functions without cash crops is relatively high; they are 0.84 and 0.74 respectively. However, for the other production function (AHs and DHs' agricultural production function with cash crops, and DHs and NAHs' OAEs production functions), the adjusted R-squared statistics are somewhat lower, in the range of 0.47 to 0.57.

Sample Selection. It was only feasible to correct for sample selectivity when estimating the NAHs' OAE production function. To do this, we applied the Heckman procedure using a probit, which modelled whether households were specialised in non-agricultural OAEs. However, the selectivity correction term was not significant at all in the NAHs' OAE production function. With the other production functions, there were no appropriate sample correction procedures for the following reasons. Firstly, the households categorised as DHs with OAE production overlap with those categorised as DHs' agricultural activities with or without cash products. Secondly, even AHs' agricultural activities have to be estimated in two sub-groups with or without cash products. Therefore, all the production functions presented in Table 4.2 are without correction for sample selectivity.

Econometric results for household production functions. Except for separating male and female labour inputs, the six production functions presented in Table 4.2 are almost the same as those in Chapter 3. To save space, here we only mention the main findings from Chapter 3 and then focus on the comparison between the productivity of male and female inputs.

The main findings are as follows. Those rural households who diversified into cash-crops, OFAs and OAEs activities rather than only grain farming were able to raise family incomes and the level of employment, and especially enjoyed increasing returns to their labour time (Table 4.2A) under the background of incomplete or partial markets and enormous disguised unemployment. Moreover, households who managed to move surplus labour off-farm do raise marginal products of labour for those left behind in agriculture. However, the market risks imposed by incomplete or partial markets for inputs, outputs,

credit, and poor information and transportation system still bite hard. To avert these risks, the majority of the rural households in our samples chose diversified income-generating activities that apparently do not benefit from economies of scale. Even those running non-agricultural OAEs have to opt for labour-intensive activities instead of capital or technology-intensive ones.

Given our focus on the relationship between male and female labour in household production, we also estimated all the six production functions using a Translog function or its reduced form.[40] Remarkably, the interaction terms between male and female labour inputs were never significant statistically. This implies that the relation between male and female labour is complementary rather than substitutional, and increasing male working hours would raise female's marginal product and vice versa, which had happened in rural Peru (Jacoby, 1992).

Now we turn to the elasticity or contribution of male and female labour to the production functions (see Table 4.2). Cash crops greatly enlarged females' elasticity in both AHs and DHs' agricultural activities especially in DHs', in which female labour played a dominant role. On the contrary, cash crops considerably reduced males' contribution in DHs' agriculture but not in AHs. This phenomenon is similar to rural Peru where Jacoby (1992) found out that women spent relatively more time than men in livestock production, whereas men were specialised in field farm work. Compared to AHs' household farming, off-farm activities led to a fall in males' elasticity of labour in DHs' agricultural production function but boosted the corresponding figure for females. This could be a result of men being more likely to go off-farm and females being left behind doing farming (see Chapter 2, Section 2.4). However, in the DHs and NAHs' OAE production, male labour was overwhelmingly dominant over female.

[40] For the DHs' agricultural production functions with and without cash crops whose observations are limited, we only put the second order term of productive inputs, and the interaction term of male labour and female labour and their interaction with land, equipment. These results are not reported here.

Finally, we discuss the marginal products of labour. Diversifying into income-generating activities like cash-crop producing, OFAs and OAEs greatly lifted up both male especially female marginal products of labour compared to pure grain farming. The exception is the marginal products of male labour in the DHs' agriculture with cash crops.

4.5 Estimation of rural labour participation and supply

4.5.1 Treatment for endogeneity problem

Since households' male and female shadow wage rates and property income (household farming or OAE profit) are generated from household production functions reported in last section, these variables can be regarded as endogenous to rural labour supply. To treat this endogeneity problem, we use the instrumented shadow wages and property income. In our case, consumption expenditure per capita by households, self-estimated house values and household capital (productive equipments) can be identified as instrumental variables. In the northeast China, there are four seasons well defined in a year, and agricultural activities are conducted yearly by sowing seeds in spring and harvesting in autumn. Thus, what rural households consume is the output of last year. In other words, consumption of this year is not related to the year's production. With respect to self-estimated house value, it is also not directly related to the current year's production. Finally, household productive equipments or capitals affect the marginal products of labour but it should not directly affect labour supply except through the shadow wage. However, choosing appropriate instrument variables is always a difficult issue in empirical studies, and validity of these instruments is an empirical matter that can only be judged by the results of over-identification tests (Jacoby, 1993).

To test whether these instruments are valid, first we conduct the F tests to see whether the instruments are significant in predicting male shadow wage, female shadow wage and property income (household farming or OAE profit). These F tests reject the null hypothesis that the instrumental variables do not affect shadow wages and property income at the 1% significant level for all these three regressions. In addition, Chi-squared over-identification tests[41] were conducted to test whether these instruments are valid to deal with endogenous problem of shadow wage and household property income in male and female supply function separately. In the male labour supply equation, the Chi-squared statistic[42] for shadow wage is 1.05, for household property income it is 4.76; in the female labour supply equation, the two corresponding figures are 3.07 and 1.53 respectively. The critical value of the Chi-statistic with degrees of freedom of three at the 5% significance level is 7.81. Therefore, the three instruments pass the over-identification tests indicating that the instrument variables identified are valid. Consequently, the predicted or instrumented shadow wages and household property income can be used as explanatory variables in the male and female labour supply functions.

4.5.2 Rural female labour participation

Since all male workers of working age in our rural household samples are working except for the few disabled, a male labour participation issue is out of the question. The reason for this could be that, in rural China, every household is entitled to have land, and male workers especially married ones as prime bread earners have no choice but to work. A further relevant issue of how rural workers choose farm or off-farm work has been

[41] The test is described in Deaton (1997: 112).
[42] The Chi-squared statistic is the product of number of observations and un-centred R-squared statistic, which is from the regression of residuals (predicted from the two stage least squares of labour supply function) on the explanatory variables inclusive of the three instruments but exclusive of the endogenous variable (Deaton, 1997: 112).

addressed in detail in Chapter 2. To save space, we don't repeat it here. Therefore, in this section, what's left is female labour participation.

In the region of interest or even in the whole China, every rural woman can work because every rural household is entitled to have land and labourers are in great shortage during the agricultural peak time. However, some working-age women still did not work for income at all. So, what are the determinants of female labour participation? To answer this question, we used a probit model to investigate the determinants. The estimated results are reported in Table 4.3. The goodness of fit - measured by the Likelihood Ratio (0.60) or the percentage of correct predictions (89%) – is highly respectable. Of the 488 women in working age in our household samples, 426 (87.30%) reported as working for income.

The rest of this sub-section will be devoted to interpreting the explanatory variables affecting female labour participation. Of the explanatory variables, own shadow wage, husband shadow wage and property income (instrumented household farming or OAE profit) are all very significant statistically. If own hourly shadow wage rate were increased one Chinese yuan, the probability of female labour participation would rise by 5.7%. On the contrary, if their male family members' (mainly husband) hourly shadow wage rate were added one Chinese yuan, the probability of female labour participation would fall by 6.4%. These two findings are expected by labour economics and in the line of the findings for the developed countries (Killingsworth, 1983: 432). However, if property income increases a thousand Chinese yuans, the probability of female labour participation would go up by 0.4%. This result of property income effect is the opposite of what labour economics predicts.

The probability of female labour participation has an inverse-U relationship with potential experience (defined as potential working years since education was completed), peaking at 46 years of experience. The mean years of experience and full time education

were 23 and 6.8 respectively, so at face value, the probit results imply that the probability of female labour participation increase until they are too old (about 60 year-old) to work. This could be explained by that rural married couples' life burdens might increase with age. For example, middle-aged couples have to pay considerable amount of education expenditure for their children given that their children were qualified for high school or even higher education; if their children couldn't go to further education after secondary school, their parents have to pay sometimes unbearable marriage and house-building cost for their sons (these kinds of cost for daughters are much less). When grown-up sons left home and lead their own life, their parents might have to work hard to repay any outstanding debts or at least to work to maintain themselves.

Being married or not does not affect female labour participation decision, nor does the number of children aged less than seven. In the region of interest or the whole rural China, the need for day cares for children might not hinder married women working. The reason is that most of their extended families live in the same village; elder people normally look after their grandchildren if the daughters or daughters in law need to work. In addition to family concerns, this kind of behaviour can also be explained by economic reasons.

In contrast, an extra child aged seven to eighteen would raise the female labour participation probability by 1.5%. This could be explained by the following reasons. In rural China, there is no financial support for family with children; children aged seven to eighteen constitute greater economic pressure on their families not only because of schooling cost but also the parents have to work hard in order to save enough money for their children's future marriage expenditure especially for sons. In rural China, although primary and second school education are compulsory, all rural education costs are paid by rural residents themselves instead of the state, whereas in all urban areas compulsory

education is guaranteed by the state budget. This urban-biased education policy apparently put more pressure on the already poor rural residents who mainly rely on subsistence farming. Note that this is only one example of many state policies that are discriminating against rural people.

Another interesting and statistically significant explanatory variable is whether a woman's family has a village or township leader. The probability of female labour participation with such a leader in the household is 98.7%, whereas without such a leader in the household, the probability is 88.6%. This implies that having a leader in the household encourages women to work for income. Finally, an extra household worker working off-farm would raise a female's possibility of labour participation by 1.5%.

To conclude, higher wage, higher property income, more children aged seven to eighteen, having a village or township leader in the household, and more household workers working off-farm all encourage women to work for income. By contrast, higher husband wage discourages women from working. Children aged under seven do not affect women's labour participation decisions.

4.5.3 Rural male and female labour supply

The male and sample-corrected female labour supply functions are reported in Table 4.4. Due to the existence of heteroscedasticity in both male and female's labour supply regression, we use the White's heteroscedastic-consistent standard errors. The goodness of fit measured by the adjusted R-squared statistics for the female labour supply estimation (0.41) is better than that of males' (0.31).

Now we turned to the explanatory variables. Both the coefficients of own wage in male and female labour supply equation (0.071 and 0.153 respectively) are very significant statistically. This implies that own wages have significant effects on rural labour supply. Male workers would increase their labour supply by 7.1% annually if their wage rate goes up by one Chinese yuan, whereas women would raise their labour supply 15.3% annually on the same schedule. The women's uncompensated wage elasticity of labour supply (0.108) is substantially higher than men's (0.072). Therefore, the coefficients of own wage and the uncompensated wage elasticities tell the same story that female labour supply in rural China is more sensitive to own wages than is male labour supply. This result is similar to that of rural Peru (Jacoby, 1993) but different from rural India where male labour supply was backward bending (Rosenzweig, 1980). Additionally, males' uncompensated wage elasticity here is in the range that was found by the American second generation studies, whereas the females' is much smaller than the result reported in those similar studies (Killingsworth, 1983: 185). The reason for this could that the male labour participation rate of our sample is not much different from that of the U.S., whereas the female labour participation rate of our sample (87%) is much higher than that of the American's (50% or so) (Berndt, 1991: 594). The majority of households in the region of interest are in a state of subsistence farming and hence cannot afford leisure if work for income is available. It is therefore reasonable that Chinese women's uncompensated wage elasticity is relatively lower than that of American women, who are the richest people in the world and thus surely can afford to sacrifice some potential income in order to enjoy leisure. The coefficient of property income in the female supply equation (-0.005, the unit of property income variable is in thousand Chinese yuans) is not significant statistically, nor is the equivalent figure for the male labour supply equation (0.002). Thus there is no need to discuss the property income elasticity further.

It isn't a surprise that men's compensated own wage elasticities or own wage substitution elasticities (0.068) are almost the same to their uncompensated wage elasticities. The same is true for women's compensated own wage elasticity (0.115). The reason for this is that both the coefficients of property income (farming or non-farm business profit) in the male and female labour supply equations are essentially zero and insignificant statistically. However, both the male and female own wage substitution elasticity cannot reject the theoretical hypothesis stated in Section 4.2 that the own wage substitution effect on labour supply is positive. Moreover, these facts provide further evidence that female labour supply is more wage elastic than male labour supply (Killingsworth, 1983: 432).

In the female labour supply equation, the coefficient of male wage (0.004) is very small and insignificant statistically. Recall that in the probit analysis of female labour participation, female labour participation was significantly discouraged by the household males' (mainly husbands) wage rate increasing. It seems that the males or husbands' wage rate increasing deters female labour participation but does not reduce female supply once they have chosen for income work. By contrast, in the male labour supply equation, the coefficient of female wage (0.098) is statistically very significant and relatively large. It appears that husbands consider their wives' earnings when they decide their own labour supply (contradicting the so-called Chauvinist model of labour supply[43]). Increase of wives' wage rates do stimulate husbands to work more. Perhaps this is because husbands cannot bear to be outperformed by their wives' earning capability. This would not be surprising given the ingrained pride and prejudices still very much alive in most places of rural China. The compensated cross wage elasticity for men is 0.056, whereas for women,

[43] The male chauvinist model assumed that, when a married woman makes her labour supply decisions, she regards her husband's earnings as part of her family's total property or non-labour income; on the contrary the husband decides his labour supply solely on his own earning and the family property income but without considering his wife's earnings (Bowen & Finegan, 1965, 1969).

it is much smaller (0.012). Clearly, this rejects the hypothesis in Section 4.2 that males and females' cross wage substitution effects are equal. Now that the Slutsky restriction of the symmetry of compensated cross wage effects is rejected, there is no need to test the non-negativity of the determinant of the Slutsky matrix (Fortin & Lacroix, 1997). This finding about rural China's labour supply behaviour provides further evidence additional to that in the existing literature (for examples, Schultz, 1990; Fortin & Lacroix, 1997) against the unitary model of the household.

Apart from these wage and income effects, we also need to report the effect of other explanatory variables on rural labour supply. The coefficients on experience and experience squared term are statistically significant for males but not for females. Both males and females' labour supply had an inverse-U relationship with potential experience, peaking at 26 years of experience. Taking into account of the years of education, male and female labour supply would both peak at about the age of 39. In contrast, the coefficients on years of education and being married are not significant. As far as health indicators are concerned, those reported in bad health significantly reduced labour supply. Finally, the coefficients of number of children are statistically insignificant.

4.6 Conclusion

This chapter has explored in depth the previously unstudied issue of Chinese rural labour participation and labour supply on the basis of a survey of 450 rural households in Northeast China. The probability of female labour participation increases with the shadow wage, property income and number of children aged seven to eighteen but decreases with their husbands' shadow wage. With respect to labour supply behaviour, female labour supply is much more sensitive to own wage changes than is male labour supply, but male

labour supply is much more sensitive to compensated cross wage effects. The Slutsky restriction of the symmetry of compensated cross wage effect was rejected, and hence this result provides further evidence against the unitary model of the household.

Like other populous developing countries, rural China is suffering from its enormous amount of surplus labour or disguised unemployment. In this sense, the majority of rural households especially for those only engaged in farming could not fully employ their own labour. Taking into account of this background, some odd behaviour of rural labour supply exhibited in the region of interest can be explained. For example, the probability of female labour participation increases with family property income and the number of labour engaged in off-farm activities. Rural households raise profit by either extending their income generating activities to cash crops, animal husbandry, poultry and aquatic products, or going off-farm through local farm wage jobs, rural-urban migration and family non-farm business (Chapter 3). In the process of raising income, these rural households also create more employment opportunities for their own labour even for their fellow villagers (Chapter 3).

Due to the existence of a vast amount of surplus labour or disguised unemployment, labour supply is constrained by the demand side rather than by the supply side in rural China. Chinese government's implicit urban-biased and rural-urban migration control policies certainly would not help ease this worrying issue. The five hundred million Chinese rural labourers can never be fully and efficiently absorbed by agriculture and local rural non-farm activities themselves (Chapter 3). Therefore, the only solution is to return the full national citizenship to the rural residents, namely, treating them equally as urban-residents and allowing them to migrate freely within China's territory to pursue their economic interests.

Table 4.1 Description of male and female labourers' characteristics

	1	2	3
	Non-working	Household farming	Working off-farm
Male			
No. of observations	0	338	185
Annual working days	n.a.	221.75	309.45
Mean of own hourly shadow wage rate (Chinese *yuan*)	n.a.	0.45	1.97
Mean of female hourly wage rate (Chinese *yuan*)	n.a.	0.42	0.84
Property income (Chinese *yuan*)	n.a.	3447.51	7172.13
Mean of consumption expenditure per capita (Chinese *yuan*)	n.a.	1739.87	2794.66
Mean of self-estimated household value (Chinese *yuan*)	n.a.	17355.62	27735.14
Household head experience in years	n.a.	28.19	28.18
Household head education in years	n.a.	6.65	7.30
Mean of education in years	n.a.	6.79	7.66
Mean of age	n.a.	36.92	35.81
Mean of experiences in years	n.a.	24.13	22.15
Being married	n.a.	87.57%	82.16%
Being party member	n.a.	4.73%	10.27%
Township or village leader at home	n.a.	2.07%	7.57%
Ratio of dependents to labours	n.a.	0.605	0.773
No of labourers	n.a.	2.33	2.318
No. of labour going off-farm	n.a.	0.16	1.66
Bad health	n.a.	2.66%	0.54%
Village 1	n.a.	48 (14.20%)	16 (8.65%)
Village 2	n.a.	19 (5.62%)	40 (21.62%)
Village 3	n.a.	43 (12.72%)	12 (6.49%)
Village 4	n.a.	32 (9.47%)	26 (14.05%)
Village 5	n.a.	27 (7.99%)	23 (12.43%)
Village 6	n.a.	46 (13.61%)	18 (9.73%)
Village 7	n.a.	51 (15.09%)	14 (7.57%)
Village 8	n.a.	42 (12.43%)	11 (5.95%)
Village 9	n.a.	30 (8.88%)	25 (13.51%)
Female			
No. of observations	62	335	91
Annual working days	0.00	190.17	298.18
Mean of own hourly shadow wage rate (Chinese *yuan*)	0.66 (predicted)	0.58	1.04
Mean of male hourly wage rate (Chinese *yuan*)	2.23	0.57	1.57
Property income (Chinese *yuan*)	5720.35	3622.70	8.397.95
Mean of consumption expenditure per capita (Chinese *yuan*)	2528.42	2276.65	2808.47
Mean of self-estimated household value (Chinese *yuan*)	25911.29	19079.70	26810.99
Household head experience in years	31.74	26.60	26.96
Household head education in years	6.61	7.01	7.40
Mean of education in years	6.81	6.68	7.32
Mean of age	36.48	36.59	32.84
Mean of experiences in years	23.68	23.90	19.52
Percentage of being married	79.03%	95.22%	81.32%
Kids aged less than seven	0.45	0.21	0.24
Kids aged between seven and eighteen	0.41	0.82	0.58
Township or village leader at home	1.61%	3.58%	4.40%
No of labourers	1.79	2.32	2.44
No. of labour going off-farm	0.81	0.30	2.04
Bad health (%)	8.06%	3.88%	0.00%
Village 1 (%)	10 (16.13%)	36 (10.75%)	10 (10.99%)
Village 2 (%)	20 (32.26%)	22 (6.57%)	11 (12.09%)
Village 3 (%)	4 (6.45%)	44 (13.13%)	5 (5.49%)
Village 4 (%)	3 (4.84%)	35 (10.45%)	20 (21.98%)
Village 5 (%)	12 (19.35%)	31 (9.25%)	9 (9.89%)
Village 6 (%)	2 (3.23%)	42 (12.54%)	11 (12.09%)
Village 7 (%)	0 (0.00%)	49 (14.63%)	3 (3.30%)
Village 8 (%)	5 (8.06%)	46 (13.73%)	0 (0.00%)
Village 9 (%)	6 (9.68%)	30 (8.96%)	22 (24.18%)

Source: Derived from our Fieldwork Survey. Notes: HH denotes household.

Table 4.2 Production functions

	1	2	3	4	5	6
	AHs without cash crops	**AHs with cash crops**	**DHs without cash crops**	**DHs with cash crops**	**DHs' OAEs**	**NAHs' OAEs** (robust)
Log male labour days	**0.134**	**0.171**	**0.100**	**0.032**	**0.195**	**0.116**
	(1.67)*	**(1.28)**	**(1.18)**	**(0.21)**	**(1.98)***	**(3.28)*****
Log female labour days	**0.055**	**0.143**	**0.095**	**0.643**	**0.043**	**0.022**
	(0.77)	**(1.65)***	**(1.08)**	**(3.67)*****	**(0.86)**	**(0.96)**
Log hired labour					0.125	0.047
					(2.11)**	(1.80)*
Log land (*mu*)	0.485	0.025	0.612	-0.181		
	(3.90)***	(0.19)	(4.15)***	(0.62)		
Log equipments	0.082	0.028	0.007	-0.031	0.066	0.096
	(3.79)***	(1.02)	(0.22)	(0.82)	(1.79)*	(2.98)***
Log (seeds, fertiliser, etc.)	0.299	0.003	0.058	0.102		
	(2.23)**	(0.04)	(0.44)	(0.37)		
Log (water and electricity)	0.033	0.023	-0.032	0.168		
	(1.33)	(0.82)	(0.67)	(1.97)*		
Log (fuel)	0.031	0.025	0.031	-0.025		
	(1.60)	(1.00)	(0.74)	(0.59)		
Log (husbandry expenditure)	0.046	0.039	-0.045	0.073		
	(3.01)***	(2.68)***	(1.33)	(2.74)***		
Log (machine maintenance)	-0.003	0.025	0.006	0.052		
	(0.14)	(0.82)	(0.23)	(1.22)		
Log (transportation)	0.006	0.042	-0.031	0.036		
	(0.35)	(1.64)	(0.91)	(0.69)		
Log (machine hiring)	0.092	-0.024	0.016	-0.022		
	(3.66)***	(-0.72)	(0.34)	(0.36)		
HH head experience	-0.052	0.025	0.049	0.013	-0.003	0.092
	(2.60)***	(1.50)	(0.91)	(0.23)	(0.04)	(3.76)***
HH head experience squared term	0.001	0.000	-0.001	0.000	0.000	-0.001
	(2.90)***	(0.88)	(1.11)	(0.15)	(0.06)	(3.23)***
HH head school years	0.006	0.041	0.000	0.104	0.117	0.035
	(0.32)	(1.61)	(0.01)	(2.81)***	(1.99)*	(0.92)
Village 1	-0.790	-1.223	-0.865	0.293	-0.740	-0.255
	(4.35)***	(4.37)***	(2.89)***	(0.41)	(1.58)	(1.17)
Village 3	-0.320	-0.855	-0.109	(dropped)	-0.299	-0.880
	(1.50)	(2.74)***	(0.32)		(0.53)	(3.19)***
Village 4	(dropped)	-0.959	(dropped)	0.229	-0.942	0.781
		(2.93)***		(0.34)	(2.82)***	(3.96)***
Village 5	-0.085	-0.831	-0.309	-0.422	-0.054	0.690
	(0.39)	(2.86)***	(1.41)	(0.67)	(0.15)	(5.18)***
Village 6	-0.887	-1.298	-1.233	0.291	-0.637	(dropped)
	(3.87)***	(3.55)***	(2.94)***	(0.42)	(1.00)	
Village 7	-0.158	-1.141	-0.968	0.193	-0.645	(dropped)
	(0.52)	(3.24)***	(2.04)**	(0.25)	(1.20)	
Village 8	-1.241	-1.470	-1.360	-0.083	-1.558	(dropped)
	(5.47)***	(4.22)***	(3.33)***	(0.10)	(2.73)***	
Village 9	-0.615	-0.348	-0.974	(dropped)	-0.542	0.061
	(3.46)***	(0.70)	(4.95)***		(1.38)	(0.28)
Constant term	3.979	7.271	6.189	3.834	6.764	6.414
	(4.73)***	(8.39)***	(6.15)***	(2.28)**	(5.63)***	(13.51)***
No. of observations	**112**	**117**	**59**	**49**	**47**	**34**
Adjusted R-squared	**0.84**	**0.53**	**0.74**	**0.57**	**0.47**	**0.53**
Standard error	**0.08**	**0.14**	**0.13**	**0.14**	**0.18**	**0.29**

Notes:

1. *** = Significant at the 1% level; **= Significant at 5%; *= Significant at 10%.
2. The t-ratios are in brackets.
3. HH denotes household.
4. The production function of NAHs' OAES was estimated with robust approach due to the existence of heteroscedasticity.

Source: Derived from the Fieldwork Survey.

Table 4.2A Marginal products of male and female labour

	1	2	3	4	5	6
	AHs' agriculture without cash products	AHs' agriculture with cash products	DHs' agriculture without cash products	DHs' agriculture with cash products	DHs' OAEs	NAHs' OAEs
Marginal Products						
Male Labour (daily)	2.99	2.94	6.44	0.79	9.38	10.56
Female Labour (daily)	1.49	4.24	3.58	14.16	2.36	2.62
Male Labour (hourly)	**0.37**	**0.37**	**0.81**	**0.10**	**1.17**	**1.32**
Female Labour (hourly)	**0.19**	**0.53**	**0.45**	**1.77**	**0.30**	**0.33**

Notes: The marginal products were derived from the production functions presented (Table 4.2).
Source: Derived from the Fieldwork Survey.

Table 4.3 Probit modelling female labour participation (1, working; 0, not working)

	1			2		
	Coefficients of Probit			Marginal effects		
	Coefficients	t-ratio		Coefficients	t-ratio	
Constant term	1.392	0.98		0.057	0.97	
Female hourly shadow wage (predicted)	1.380	4.33	***	0.056	2.58	***
Male hourly shadow wage (predicted)	-1.569	-8.24	***	-0.064	-2.74	***
Property income (farm profit predicted)	0.100	3.10	***	0.004	2.27	**
Log consumption expenditure per capita	-0.043	-0.15		-0.002	-0.15	
Log self-estimated house value	-0.047	-0.31		-0.002	-0.31	
HH head experience	-6.34E-02	-0.95		-2.59E-03	-0.95	
HH head experience squared term	3.41E-04	0.33		1.39E-05	0.33	
HH head education in years	0.048	0.60		0.002	0.58	
Experience	1.43E-01	2.13	**	5.84E-03	1.67	*
Experience squared term	-3.10E-03	-2.49	***	-1.27E-04	-1.84	*
Education in years	-0.094	-0.99		-0.004	-0.94	
No. of kids aged 0-6	-0.008	-0.02		0.000	-0.02	
No. of kids aged 7-18	0.370	1.76	*	0.015	1.59	
No. of labour off-farm	0.370	2.21	**	0.015	1.68	*
Reported in bad health	-0.767	-1.37		-0.031	-1.21	
Married	0.648	1.03		0.026	0.99	
With township or village leader	2.273	2.43	**	0.093	1.93	**
Village 1	-0.114	-0.24		-0.005	-0.23	
Village 3	1.128	1.81	*	0.046	1.74	*
Village 4	-0.617	-1.19		-0.025	-1.08	
Village 5	0.985	2.03	**	0.040	1.78	*
Village 6	1.394	1.74	*	0.057	1.74	*
Village 8	0.120	0.22		0.005	0.22	
Village 9	0.162	0.31		0.007	0.31	
Observations	**488**					
Log-likelihood	**-73.50064**					
Restricted log-likelihood	**-185.8004**					
The log-likelihood ratio index	**60.44**					

	Predicted		
Actual	0	1	Total
0	47	15	62
1	6	420	426
Total	53	435	488

Notes:

1. *** = Significant at the 1% level; **= Significant at 5%; *= Significant at 10%.
2. The t-ratios are in brackets.
3. HH denotes household.

Source: Derived from the Fieldwork Survey.

Table 4.4 The estimated equations of rural male and female labour supply (labour supply are measured by annual working hours per labourer)

	1	2
	Male	**Female**
Constant term	4.824	4.317
	(37.40)***	(20.45)***
Own hourly shadow wage (predicted)	0.071	0.153
	(2.94)***	(2.67)***
Opposite sex workers' hourly shadow wage (predicted)	0.098	0.004
	(3.13)***	(0.08)
Property income (farm profit predicted)	0.002	-0.005
	(0.55)	(0.80)
Experience	2.47E-02	2.10E-02
	(2.08)**	(1.41)
Experience squared term	-4.82E-04	-4.01E-04
	(2.13)**	(1.44)
Education in years	-0.003	-0.001
	(0.27)	(0.09)
Married	-0.018	0.041
	(0.21)	(0.28)
No. of kids aged 0-6		-0.062
		(0.90)
No. of kids aged 7-18		0.044
		(1.18)
Bad health	-0.585	-1.169
	(3.30)***	(8.46)***
Village 1	0.190	0.590
	(1.97)**	(4.15)***
Village 3	0.398	0.788
	(4.56)***	(5.48)***
Village 4	0.531	0.885
	(7.02)***	(6.78)***
Village 5	0.230	0.559
	(3.34)***	(4.48)***
Village 6	0.081	0.378
	(0.89)	(2.45)***
Village 7	0.306	0.616
	(3.41)***	(4.52)***
Village 8	0.428	-0.031
	(4.70)***	(0.20)
Village 9	0.009	0.329
	(0.10)	(2.46)***
Selectivity variable (lambda)		0.243
		(1.77)*
No. of observations	**523**	**426**
Adjusted R-square	**0.3058**	**0.4077**
Uncompensated shadow wage elasticity	**0.072**	**0.108**
Own-substitution elasticity	**0.068**	**0.115**
Cross- substitution elasticity	**0.056**	**0.012**
Gross property elasticity	**0.010**	**-0.024**
Mean of own shadow wage	1.020	0.709
Opposite sex workers' shadow wage of the sample	0.596	0.821
Mean of own labour supply (annual hours)	255.925*8	215.370*8
	213.543*8	255.062*8
Mean of property (1,000 Chinese yuan)	4765.015	4779.671

Note:

1. Male labour supply has been sample-corrected by Heckman probit-OLS procedure.
2. Female labour supply has been sample-corrected by Lee multinomial logit – OLS procedure.
3. *** = Significant at the 1% level; **= Significant at 5%; *= Significant at 10%.
4. The t-ratios are in brackets.
5. HH denotes household.
6. Unit of wage and property income is in Chinese yuan.

Source: Derived from the Fieldwork Survey.

Chapter 5

CONCLUSION

The main task of this thesis has been to examine the rural people's livelihood in term of income generating activities using a survey of 450 rural households in the northeast China. To conclude, a general summary of what have been found and concluded in previous chapters will be presented. Additionally, this chapter also concludes by discussing two issues as follows. What did this thesis contribute? What policy suggestions can be drawn from this research? The summary and answers to these two questions will be given in the rest of this chapter in turn.

5.1 A general summary

This thesis has modelled the allocation process of income generating activities among rural dwellers at both the individual and household levels. The evidence from this study suggests that market forces rather than political factors decide the allocation of private off-farm opportunities. The most important aspect of human capital – school education has demonstrated as a potent factor in assisting rural residents to get local non-farm waged jobs and to migrate to secure urban employment. The possession of non-agricultural skills significantly encourages rural households and individuals to go off-farm.

The political factors identified as party memberships or having a local government official in the household still have positive influence on helping rural workers to obtain some increasingly restricted types of non-farm waged jobs in local public sector. As far as social factors are concerned, the number of household members of working age and the dependency ratio still exert significant effects on pushing rural households and individuals off farm and into non-agricultural self-employment.

To sketch a full landscape of the determinants of earnings in a variety of income generating activities, this thesis has estimated Mincerian earnings functions for local non-farm wage earners, rural-urban migrants and local agricultural waged workers, and modelled production functions for household farming and family non-farm enterprises. With respect to waged jobs, once again we have revealed that market forces are far more important than political factors in determining earnings, especially in the ever-growing private off-farm sector. The results from both earnings and production function estimation show that school education is well rewarded for those running family non-farm enterprises and those out-migrating. Finally, the three statistical procedures deployed in Chapter 3 have uncovered that rural households having diversified into riskier income generating activities such as cash-crop producing or family non-farm enterprises rather than staying on conventional grain farming were able to raise family incomes and employment, and more importantly enjoyed increasing returns to their labour time. Indeed, those households that managed to move surplus labour off-farm were even able to raise the marginal products of labour for those left behind in primary production.

Besides examining the allocating and remunerating process of different income generating activities among rural dwellers, Chapter 4 the final key chapter of this thesis explored the previously unknown characteristics of Chinese rural labour participation and labour supply behaviour. The econometric results suggest that the probability of female

labour participation increases with their shadow wages, property income and number of children aged seven to eighteen but decreases with their husbands' shadow wages. Female labour supply responds much more to own wage changes than male labour supply does, but male labour supply is much more sensitive to compensated cross wage effect. Finally, the statistical results also rejected the null hypothesis of the unitary model of the household.

5.2 Contribution of the thesis

For my PhD studies, I myself conducted a 450-rural-household survey by using scientific sampling methods with purpose-designed questionnaires in a cluster of nine villages located in Xinmin County (Liaoning Province, the northeastern China) in 1998. To pick up some missing values, I went back to these nine villages again in the year of 1999. Think of the nine villages scattered in boundless countryside, not only how much time visiting them one by one would take, but also the household survey had to be carried out in great patience and carefulness. Were it not for the crucial and kind help from the mayor of Xinmin City and many other friends, my fieldwork would not have been done so successfully.

With respect to the thesis based on the 450 rural household surveys, the three questions as stated at the very beginning of Chapter 1 have been examined. Of them, the systematic analysis of the Chinese rural labour participation and labour supply behaviour (Chapter 4) might be considered as a major contribution of the thesis. The reason is that, to my knowledge, there hasn't been any published study of Chinese rural labour participation and labour supply.

Additionally, the three procedures designed to investigate what rural households gain from active diversification (Chapter 3) are innovative. Not only were the gains of

rural households from diversification analysed in terms of income, employment and returns to household labour, but also two explanatory variables were constructed as surrogates for income source diversification in a series of household production functions. By these procedures, the gains of diversification were explored thoroughly and rigorously.

The question of the allocation of and remuneration to off-farm activities (OFAs) in rural China (Chapter 2) had been investigated by previous studies (Knight & Song, 1997; Cook, 1998). However, probably this thesis was also the first attempt to disclose the labour prices and determinants of earning during agricultural peak time in Chinese context. Additionally, as was said before, the region targeted by my fieldwork is different from those covered by the previous studies.

A very interesting issue remains to be addressed at the end of this thesis is whether a unitary model or a collective model better explains the intra-household income distribution, labour participation and labour supply behaviour. Sex discrimination inside the household still largely exists in rural China, where the traditional boy-biased custom has been much strengthened by the 'one child' state policy. However, the extent and results of sex discrimination within the household in terms of income distribution and education investment are far from clear. Lack of understanding of this issue definitely hinders the formation of appropriate policy suggestions on tackling the intra-household sex discrimination.

5.3 Future rural development in China and policy implications

As we have found out and stressed repeatedly that the fundamental problem haunting rural China is that there are too many people but too few lands and the existence

of policy obstacles of labour mobility especially between rural and urban. Besides, rural China also faces a series of difficulties, such as slow growth of income relative to urban areas, rising income inequality especially between rural and urban, the existence of chronic poverty in some middle and western areas, stagnation of rural non-farm sector, ceaseless natural disasters caused by weak environmental protection, extremely poor rural human development conditions and the challenge of WTO accession (Yao, 2002). In the rest of this section, a few aspects about the future development in rural China related with this thesis, and the corresponding policy implications drawn and arranged immediately after each particular aspect of the future development, will be presented in turn.

Rural-urban migration. According to the economic development experience from the developed countries, a long-term solution to the rural surplus labour should be rural-urban migration. This is because the capacity of job creation of urban industrial and service sectors is far greater than that of agricultural and other rural non-farm sectors. A country's industrialisation process is just the one in which rural labour force is continuously transferred by the market forces to urban industrial and service sectors. However, in the ex ante reform period, the rural-urban migration in China had been artificially blocked by the state policy. Since the economic reform started in the late 1970s, although the rural-urban migration has been increasing all the time, Chinese government never officially allows or encourages it. The recent nationwide massive retrenchment of workers by the state-owned-enterprises has put more pressure on the urban labour market. Not only have rural-urban migrants encountered fierce competition in the urban job market but also the *xia gang* policy has led to tighter controls on migrants, aimed at restricting their numbers and in this way assisting retrenched urban workers (Appleton *et al.*, 2001). With millions of urban workers staying unemployed, the future of potential rural-urban

migrants is not bright. Indeed, many migrants have to go back to household farming during some bust periods (Zhang, Rozelle & Huang, 2001). Institutionally, the migration-control oriented *hukou* system has been relaxed over the time and this trend will continue in the future. However, there is no sign that Chinese government will completely abolish it (Solinger, 1999, p. 282). At the same time, the entrenched and unchallenged urban bureaucracy, the urban rationing system (such as education for children, medical care, pension, etc.) and the unobservable institutionalised prejudice will continue to operate discriminating against rural-urban migrants. In other words, these marginalised migrants still cannot hope to get urban citizenship in foreseeable future.

Against these gloomy portents, there are also positive aspects and developments. The rural-urban migration, with the 88 million strong migrants[44] in the cities themselves – along with markets – has been exerting and will further exert influence towards dismantling the prejudices of all sorts and the institutional arrangements that discriminate against migrants. At the same time, migrants are always capable of creating jobs for themselves and their own labour markets. Moreover, the established migrant societies in cities will facilitate more rural-urban migration through their own urban-rural links, network and information systems. In a historical view, the bureaucratic system would never beat market forces. Once the water gate is opened, the raging torrents would be unstoppable. A recent study by de Brauw *et al.* (2002) found out that the rapid increase of rural-urban migration has continued and accelerated during the late 1990s. Another positive development is that the new Wen Jiabao cabinet which sworn in March 2003 has promised to give rural-urban migrants better treatment.

An immediate policy implication about the rural-urban migration is that there should be a state legislation to give rural-urban migrants the equal rights with urban residents such

as industrial relations, work conditions, compulsory pension, medical insurance, education of migrants' children, etc. To maximise the net benefit from WTO membership, China have to adopt a policy to gradually relax its rural-urban migration control in conjunction with its labour market reform (Zhai & Wang, 2002). In the long term, the *hukou* system aimed rural-urban human migration control has to be abolished. This is because institutionally discriminating against one's own rural population and treating them as the second-class citizens in a modern country is a shame and hence untenable in a long-standing view. Once the *hukou* system being abolished, certainly surplus labour pressure on rural sector will be gradually reduced. Although greater competition triggered by the mobility of labour forces and breakdown of entry barriers often drives people with less comparative advantages out of business, the country as a whole will benefit. In this sense, greater labour mobility will boost the country's macroeconomic efficiency and bring about Pareto improvement. In other words, the social and economic deadweight loss caused by the nationwide block of labour mobility would be greatly reduced, and hence the whole country's social welfare would be increased.

Rural non-farm sector. The findings of this thesis show that returns to labour time are much better in local non-farm activities than in household farming and just the next to what rural-urban migrants have earned. However, this sector has experienced recession rather than any booming since the mid-1990s (Oi, 1999; Yao, 2002; Zhao & Wong, 2002). Given that the whole Chinese economy has fundamentally stepped onto a new stage of over-supply of all goods from the old stage of shortage since the mid-1990s, it could be doubted what sort of comparative economic advantages the rural industrial or manufacturing enterprises still have considering their weak state of transportation,

[44] During his inaugural press conference held in Beijing at 19 March 2003, China's new prime minister Mr

information, technology, high-skilled labour, distance to market, etc. Perhaps this is the profound reason that rural industrial sector has moved into recession in recent years (Johnson, 2002). In fact, the existence of some heavy-polluted rural industrial enterprises has been and will carry on damaging the country's vulnerable environment system (Yao, 2002). Although these rural enterprises could provide some income and jobs for the local peasants, their negative externalities will eventually exceed their positive benefits. These facts suggest that the future of the rural industrial sector is not optimistic.

Although more than twenty years have passed since the economic reformed started in the late 1970s, China's economy is suffering from the too much and too arbitrary government intervention, which is the legacy of the centralised and planned economy. For example, to reduce rural-urban migration and over-urbanisation, Chinese government had encouraged rural collective industrialisation in the 1980s (Liang, Chen & Gu, 2002). However, as Liang, Chen & Gu (2002) found out, this strategy did not have significant effect on rural-urban migration. Another problem related with the government intervention is that governments at lower level are not well disciplined or controlled by the central government. In fact, the central government cannot perfectly differentiate between lower level governments' simple incompetence and wilful or strategic disobedience such as arbitrarily intervening into enterprises and rural households' economic decision making process, rent-seeking, corruption, protecting regional interests (Wedeman, 2001). Perhaps this is one of the reason why the rural collective-owned township and village enterprises (TVEs) had over-flourished before the mid-1990s. Since then, the majority of collective TVEs had been privatised under the central government's decree. Consequently, the whole TVE sector stepped into restructuring, consolidation and slight recession. The results of all these government intervention are distorted markets, uneconomic resource allocation and

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Wen Jiabao admitted that the correct number of the current rural-urban migrants is 120 million.

waste of scarce resources, stockpile of unwanted products, heavy debt, etc. Policy implication drawn from these lessons is to significantly reduce government intervention and let market forces decide the fate of rural industrial enterprises. This implication is also applied to the small town development. With respect to the pollution caused by rural industrialisation, there should be tough laws and tough enforcement of these laws to protect the country's fragile environment against pollution.

The agricultural sector. Following the dramatic success in raising grain output and peasants' income from the late 1970s' reform, the agricultural sector has stepped into stagnation since the early 1990s. The economic deflation since the mid-1990s has led to weak market demand and unprofitable prices for agricultural products. At the same time, the peasants have to pay the notoriously heavy taxes and fees imposed by the ever-growing local bureaucracy in order to finance the compulsory education for rural students who account for 70 percent of the country's student population, and to maintain 70 percent of the country's bureaucracy at and below the county level (Zeng, 2002). The consequence is that the urban-rural income gap has been continuously widening in the 1990s (Table 1.2; Yao, 2002). Rather than boosting demand, China's very recent successful entry of WTO would strip off the state protection against foreign cheap and high quality food import (Huang, Rozelle & Zhang, 2000). This has begun hitting and in the future will hit harder the domestic agricultural products of high cost and poor quality (Lin, 2000; Hua & Liu, 2002; Rempel, 2002). This was why there were nationwide outcries about peasants' miserable condition. In words, Chinese farmers' future is also not optimistic.

A positive development is that Chinese government has now realised the heavy taxes and fees levied on rural households and rural enterprises by the local administration, and started legalising rural taxation standards to restrict the countless taxes and fees. Once

a standardised rural taxation system being set up, the tax burden on peasants could be reduced on a large scale. Another favourite development is that Chinese central authority has started downsizing its huge bureaucratic system from top to bottom and then fixing the quantity of civil servants from now onwards. Peasants have been suffering from the ever-growing and ridiculously large local bureaucracy all the time. Any attempt of downsizing before ironically always led to further enlargement of them. However, this time might be different because governments at the central and provincial levels have already finished their downsizing scheme by cutting half of the civil servants. The new Wen Jiabao cabinet has pledged to further downsize governments at and below county level. This reform will percolate down to the governments at the bottom level very soon.

In principle, the current schemes of downsizing governments or shedding non-essential government functions and legalising rural tax standards are the right road map for rural development. On one hand, leaner governments would reduce public expenditure on personnel cost, and hence spend the saved budget on other important areas such as education and reduce tax burden on rural residents. On the other, it will reduce the amount of government officials' protecting regional economic interests, rent-seeking and corruption if this measure is unable to erase these negative sides (Young, 2000; Morduch & Sicular, 2000; Che, 2002). Another serious problem existing in rural China is that local governments often sacrifice peasants' interests for rent-seeking and corruption. For examples, local governments sometimes expropriate land without the consent from peasants; some village administration regularly reallocated land and changed land contracts signed with peasant households to get some illegal income (Guo, 2001; Wedeman, 2001). These imply that on one side, local governments should be constrained and regulated; on the other, rural residents are powerless and voiceless. Therefore, there

should be a clear legislation on village's collective land ownership to protect the peasants' interests.

The rural human development arrangements. There is no sign that the state will fund rural compulsory education system and medical care, let alone the state pension for rural olds. Although paying taxes to the governments at both local and central levels, Chinese peasants still have to continue funding education for their children by themselves, buying medical care by themselves and relying on their offspring when getting old. To maintain the struggling education system and the ever-growing local bureaucracy, the majority of local governments at the township and village level are heavily in debt, which, of course, is also the accumulative result of establishing and running inefficient collective-owned enterprises. Additionally, the formidable and ever-growing higher education tuition fees will definitely create more obstacles for the sons and daughters of Chinese peasants to go to university. In general, in an absolutely government-dominant society like China, ordinary people especially peasants are voiceless, powerless and vulnerable. The vulnerability is particularly reflected in the lack of medical care across the countryside. A sick family member would cause the whole household stepping into poverty, whereas a serious illness would knock a family out in the sense that the family could be bankrupted.

To assist rural human development, if not being able to shore up medical care for rural residents and the state pension for the rural olds, the government can at least spare a share of the state budget to spend on rural compulsory education. Furthermore, the government can aid rural talented youths, whose parents cannot afford tuition fees for them, to get higher education through a state cheap student loan arrangement, which many other countries have been doing all the time. However, in the long-term Chinese government should gradually build up a countrywide medical insurance system and state

pension scheme (Ding, 2002). In theory, a country's sustainable economic growth relies on her well-educated and balance-developed labour force. At the end of the day, if not for healthy human development across the country, what is the purpose of a nation's economic growth?

APPENDIX

RURAL HOUSEHOLD SURVEY QUESTIONNAIRE

PART 1

RURAL HOUSEHOLD

Household Code: ( )
Village: ( )
Township: ( )

1. Household

(1)	(2)	(3)
No. of household members	No. of labour	No. of working labour in 1997

2. Contact of household with urban areas

(1)	(2)	(3)	(4)	(5)
Relatives or friends	Location	When moved?	What kind of	Frequency of

Note:
(1) Relatives or friends: there are three answers,
   a) there are relatives or friends in the city, and contacts frequently;
   b) there are relatives or friends in the city, and contacts not frequently;
   c) There are no relatives or friends in the city.
(4) What sorts of contact?
   a) visits;
   b) telephone;
   c) writing letters.
(5) Frequency of contacts:
   a) contacting every two months;
   b) contacting every half year;
   c) every year;
   d) every two years;
   e) almost no contact.

3. Member of household

(1) Index	(2) Name	(3) Relation with household head	(4) Sex	(5) Age	(6) Education	(7) Marriage status	(8) Health status	(9) Working status	(10) Reason of not working
1									
2									
3									
4									
5									
6									
7									

Note:

(3) The relation with household head:
- a) household head;
- b) spouse;
- c) children;
- d) children in law;
- e) parents;
- f) grand children;
- g) grand parents;
- h) other relatives;
- i) non relatives

(4) Gender:
- a) male,
- b) female

(6) Education level:
- a) polytechnic and above,
- b) technology school,
- c) senior school,
- d) junior school,
- e) primary school grade of 4 to 6,
- f) primary school grade of 1 to 3,
- g) self-taught,
- h) illiterate

(7) Marital status
- a) married
- b) not married yet
- c) widowed

(8) Health status
- a) good
- b) fair
- c) bad
- d) ill

(9) Working status
- a) full time
- b) par time
- c) not working at all

(10) Reason of not working
- a) being student

b) Doing home work
c) Too ill to work
d) Too old to work
e) Too young to work

4. Area of land and water contracted by household or household member in 1997

Sorts of land	Index	Direct contract from Collective (Mu)	Sub-contract-in or Lease-In (Mu) & rent per mu	Sub-contract-out or Lease-out (Mu) & rent per mu
Cultivable land	1			
Irrigated land	2			
Non-Irrigated land	3			
Plain land	4			
Sloping land	5			
Forest land	6			
Fruit garden	7			
Timber forest	8			
Other forest	9			
Uncultivated land	10			
Uncultivated sloping land	11			
Silted land	12			
Other uncultivated land	13			
Water area	14			
Fish pond	15			
Other cultivated water area	16			

5. Household agricultural activities income in 1997

Index	Income items of agricultural activities in the whole year	Income (RMB)	Of them from outside the township
1	Sale of grain		
2	Sale of other agricultural products produced from land		
3	Sale of fruit and timber products		
4	Sale of poultry and animal products		
5	Sale of products produced in water area		
6	Value of products of not sold out and for use in household		
7	Sale of household sideline products		
8	Income from attending to collective agricultural activities or agricultural capital construction		
9	Income from the employed agricultural activities		
10	Income from other agricultural activities		

6. Household expenditure on agricultural activities in 1997

Index	Expenditure items of agricultural activities in the whole year	Expenditure (RMB)	Of them from outside the township
1	Chemical fertiliser, pesticide, seeds and farm plastic film, etc.		
2	Water, electricity		
3	Diesel, petroleum, and coal etc. for production		
4	Fodder, stud stock, and other foster activities		
5	Machinery maintaining and repairing		
6	Training, purchasing materials for learning, and employing experts		
7	Temporary employees		
8	Transportation cost for sale of agricultural products		
9	Agricultural tax and other taxes fees related with agricultural activities		
10	Rent of leased-in land		
11	Other agricultural expenditure		

7. Projects of non-farm activities run by household or household members alone or co-operating with other individuals, households, enterprises, and its net income

Item	Industry	Operating alone or co-operatively	Official registration	Characteristics of business	Area reached by the business	location	Net income of whole year (Yuan)	No. of employees	Average employed period /per employee
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

8. Net income earned by household members employed by other enterprises, organisation, households and individuals to do non-farm activities in 1997

Index	Industry	Wage income from home township	Wage income from outside home township but inside home county	Wage income from home province but outside home county	Wage income from other provinces
1					
2					
3					
4					
5					
6					
7					
8					

9. Household's other income in 1997

Income item	Social relief	Dividend distributed by village or team	Presented by relatives or friends	Stock, bond and interest income	Other income
Income (Yuan)					

10. Household property and debt in the end of 1997

Property			Debt		
Index	Item	Current value of property (Yuan)	Index	Item	(Yuan)
1	Fixed property for farming		6	Bank loan and interest	
2	Fixed property for non-farm		7	Borrowing from village collective	
3	Bank deposit, stock, and bond etc.		8	Borrowing from individuals	
4	Estimated value of house		9	Current value of borrowed grain and other property	
5	Lending-out		10	Other debt	

11. Teenager and Child Labour

1	age	sex	type of job	no. of days worked in 1997
2				
3				

PART 2

ATITUDE AND ASPIRATION

1. Are you happy with your household's production structure?
   (1) Very happy.
   (2) Relatively happy.
   (3) So so.
   (4) Unhappy.
   (5) Very unhappy.

2. Are you happy with your household's income?
   (1) Very happy.
   (2) Relatively happy.
   (3) So so.
   (4) Unhappy.
   (5) Very unhappy.

3. Are you happy with your household's labour employment?
   (1) Very happy.
   (2) Relatively happy.
   (3) So so.
   (4) Unhappy.
   (5) Very unhappy.

4. (a) Do you think whether your household's labour has been fully used?
   (1) Fully used.
   (2) Un-fully used.
   (3) Don't know.
   (b) If the answer of (a) was (2), how many months are your household's labour idle per labour?

5. (a) Whether do your household wish to increase or reduce the contracted land?
   (1) Wish to increase.
   (2) Wish to reduce.
   (3) Wish no change.

   (b) If in (a) the answer was (1), how many Chinese Mu of land do you wish to increase?

   (c) If in (a) the answer was (2), how many Chinese Mu of land do you wish to reduce?

6. (a) If the contracted area of land or water are not increased, Whether or not the net income from farming can be increased?
   (1) It can.
   (2) It is possible but very difficult.
   (3) It is impossible.
   (4) Don't know.

(b) If in (a) the answer was (1) or (2), through which kind of ways can your household increase agricultural net income?
(1) Invest more labour;
(2) Change the structure of planting, such as increase different kinds of cash crop;
(3) Increase investment, such purchasing chemical fertiliser, machinery etc.
(4) Improve the skills of planting or fostering;
(5) Depending on the condition existed, expanding fostering scale;
(6) Others.

(c) If in (a) the answer was (3), what are the reasons?
(1) There is no much profit by selling agricultural product;
(2) Planting cash crops or fostering is very risky;
(3) Investment in agriculture has been enough, so increasing investment will be worthless;
(4) The household members think that it is not interesting to do farming, so they do not wish to spend more time on it.
(5) Others.

7. (a) Whether do you think that the household should have various channel to get income?
(1) It should.
(2) No.
(3) Don't know.

(b) If in (a) the answer was (1), main reasons:
(1) More channels to get income can increase income;
(2) More channels to get income can reduce risk and maintain stable income level;
(3) Other reasons.

(c) If in (a) the answer was (1), from how many kinds of channels should your household get income ?
(1) Farming;
(2) Commercial activities;
(3) To set up and run a industrial enterprise;
(4) To set up and run a service enterprise;
(5) Getting job in local rural enterprises;
(5) Getting job outside local place.

8. (a) Whether do you think that your household's income from agriculture was too less?
(1) It was.
(2) No.
(3) Don't know.

(b) If in (a) the answer was (1), main reasons:
(1) Lack of capital;
(2) Lack of technology;
(3) Lack of information for production or job opportunity;
(4) Lack of social contacts;
(5) lack of urban contacts;

(5) Lack of information
(6)Others.

9. (a) Does your household have a concrete plan to engage in non-farm activities for increasing income with your home township?
(1) Yes. (2) No. (3) Don't know.

(b) If in (a) the answer was (1), the channels to increase income should include:
(1) Increase investment on the current production activities and expand its scale;
(2) Increase more labour or employing more employees on the current production activities, then expand its scale;
(3) Run new project or setting up new enterprise;
(4) Household member should improve their skills to increase wage income;
(5) Household member try to find jobs in other enterprises;
(5) Others.

(c) Which kind of industry do you plan to expand production scale or set up new enterprise or find jobs?
(1) Extracting;
(2) Manufacturing;
(3) Construction;
(4) Communication and transportation;
(5) Business and catering;
(5) Services;
(6) Other non-farm activities.

10. (a) Does your household have someone intend to get job outside local town or increase time period of working outside local town?
(1) Yes. (2) No. (3) Don't know.

(b) If in (a) the answer was (1), what are the main reasons that your household members have not worked outside local town or worked insufficiently?
(1) Don't know how to get job outside local town;
(2) Nobody introduces job;
(3) There is someone introducing jobs but household members are not qualified;
(4) There is too much farming task to go away;
(5) Communication is inconvenient;
(5) Others.

(c) If your answer to (a) is (1), what reasons can encourage your household member to make his/her mind?
(1) Too many family members but with too few land
(2) Low harvest due to natural disaster
(3) Earning more in urban area
(4) To save some money
(5) Try to run away from rural life
(5) To learn some technology in urban area
(6) Others

(d) If in (a) the answer is (2), main reasons are:

(1) Going outside local town is not secure, so not dare to go outside;
(2) Working outside hometown is too arduous, so don't want to go;
(3) Being afraid that expenses may be too much and can not get saving by working outside hometown;
(4) No travelling funds;
(5) Being afraid of not finding jobs;
(5) Inconvenient transportation;
(6) Never thinking about going away from hometown;
(7) Others.

11. What are the main difficulties and obstacles that affect your household to raise income level and to improve employment situation in your opinion?
(1) Policy restrictions;
(2) Lack of capital;
(3) Lack of good job opportunities;
(4) Lack of technology;
(5) Low education level of household members;
(5) Lack of household labour or household member are not in good health;
(6)Lack of information
(7) Others.

12. If your household member has got a urban job which your household member thinks is good, then
(1) Keep it as long as possible
(2) Save enough money then go back to home village
(3) Leave after getting technology or experience

13. Whether have you heard the situation of employment and income of other places?
(1) Yes; (2) no

14. If you have heard, who provide these information to you?
(1) Family members or relatives
(2) Friends or home town mate
(3) Newspaper, broadcast or advertisement
(4) Local official or half-official employment introduction organization
(5) By chance
(5) Others

15. If you feel that urban life is happier than rural life, what's reason?
(1) You like urban prosperity and convenience
(2) You have opportunity to earn more money
(3) It is possible for you to develop your own business
(4) Settling in urban area is good for children's future
(5) Others

16. If your household has migrant, what is the behind reason for their migration?
(1) No much work to do if staying at home
(2) To earn more money
(3) To get more experience of life
(4) To learn more skill

(5) Others

17. (a) Do you or other your household member have intention to learn a kind of skill?
(1) Yes. (2) No. (3) Don't know.

(b) If in (a) the answer was (1), what are skills that you wish to learn?

Grain planting	( )	Carpenter ( ) Hostel service	( )
Fruit tree administration	( )	Bricklayer ( ) Electronics application repairing	( )
Vegetables gardening	( )	Automobile driver ( ) Typing	( )
Fostering	( )	Automobile repairing ( ) Accounting	( )
Mechanic process	( )	Cooking ( ) Tailor	( )
Electrician	( )	Barber ( ) Knitting	( )
Others			

18. If you or other members of your household wish to learn skills, would you like to spend money on skill training?
(1) Yes;
(2) No;
(3) Yes but have some prerequisites (such as expense is not high and can learn some skills);
(4) Don't know.

19. (a) If you or other members of your household wish to attend to skills training, are there any difficulties in your opinion?
(1) Yes. (2) No.

(b) If in (a) the answer was (1), main difficulties are:
(1) There is no suitable training class;
(2) No time to attend to skill training;
(3) There is no enough money to pay training fees;
(4) The education level is too low; there is difficulty in learning;
(5) Wish to learn but don't know which kind skill is suitable;
(5) Other difficulties.

PART 3

LABOUR

Household Code Family Member Code Name

A. General Information

1. Personal detail and social experience

Time of beginning work	Technical skills	Accepted training and how many month	Main job engaged in 97	Whether or not still working outside hometown
Month Year				

Party member or not	Had ever been in service	Had ever been township officer	Had ever been village main leader	Had ever been teacher	Had ever been to large cities	Had ever been to cities above middle level in other province

2. Employment experience

Index	Profession	Time of beginning (year)	Region reached during employment	Employment location	Ownership of working unit	Duty engaged	Time of ending (year)	Accumulated working period
1	Farming							
2	Forest							
3	Animal farm							
4	Fishing							
5	Extracting							
6	manufacturing							
7	Construction							
8	Communication and transportation							
9	Commerce and catering							
10	Services							
11	Household work							
12	Others							

3. The latest (or current) employment outside home province

Province	Employment location	Ownership of employer	Industry	Profession	Beginning time	Ending time	What kind of income	Channel of employment

4. The time engaged in agricultural activities and its income in the whole year of 1997

Individual agricultural activities				Percentage of your contribution to the household agricultural income (%)	Outside household	
Busy season		Idle season			No. of working days (in the whole year)	Average working hours per day
No. of working days (in the whole year)	Average working hours per day	No. of working days (in the whole year)	Average working hours per day			

No. of days of the busy seasons	
No. of days of the idle seasons	

5. Time engaged in the non-farm activities and income from it in the whole year of 1997

Non-farm activities run by household		Employed by other enterprises or household		
No. of working day in the whole year	Individual income's proportion of the household's that item income (%)	No. of working day in the whole year	What kind of income	Wage income of the whole year (Yuan)

6. No. of working day in 1997

No. of working day	Of these		
	No. of whole day	No. of half day	No. of below half day

7. All job in 1997

	farming or non-farming	urban or rural	private or collective or state-owned ownership job	employed or self-employed	No. of days engaged in each job 1997	income from each job in 1997
first (main) job						
secondary job						
third job						
forth job						

B. Non-Agricultural Employment

Household Code Family Member Code Name

1. Where is s/he working now?
   (1) Municipality directly under central government or provincial capital
   (2) Provincial prefecture city
   (3) County level city or county council base town
   (4) Town
   (5) Other rural area
   (5) Economic special region
   (6) Others

(1a). Where is his/her rural enterprise job located?
   (1) Home village.
   (2) Home township but not home village.
   (3) Home county but not home township.
   (4) Home city (or prefecture) but not home county.
   (5) Home province but not home city (or prefecture).
   (5) Other provinces

2. What are their current working unit?
   (1) state-owned unit
   (2) Urban collective unit
   (3) Urban private unit
   (4) Township or village-owned enterprises
   (5) Rural private enterprises
   (5) Joint venture or foreign sole owned enterprise

3. What kind of industries is s/he engaged in?
   (1) Agriculture
   (2) Mining
   (3) Manufacturing
   (4) Construction
   (5) Transportation
   (5) Services
   (6) Others

4. What kind of job does s/he do?
   (1) Officer or administration staff
   (2) Professional or technical staff
   (3) Office clerk
   (4) Service or supporting worker
   (5) Non-agricultural manual worker
   (5) Non-agricultural technical worker (including driver)
   (6) Agricultural manual worker
   (7) Self-employed business

5. What's his/her current income per month?

6. How much money will s/he remit per month and per year averagely if you are migrant?

7. How many month occupation training has s/he got?

8. How far is his/her working point from his/her home village?

9. How was the decision on his/her migration made?
   (1) him/herself
   (2) Spouse
   (3) Parents
   (4) Children
   (5) Friends
   (5) Other relatives
   (6) Through discussion with other family members
   (7) Through discussion with friends
   (8) Others
10. Why does s/he choose to work in that place (city or town or others)?
   (1) There are relatives (family members)
   (2) Friends or hometown mates
   (3) It was heard that it is easy to find job there
   (4) It was heard that income is high there
   (5) That city or town is near to your home village
   (5) Suitable for the weather, living customs, and language of that place
   (6) Others
11. If his/her goal of migration is earning more income, his/her income has been (or will be) mainly used for
   (1) Building house
   (2) Purchasing house or apartment
   (3) For other family members' usual expenditure
   (4) Saving for setting up his/her own enterprise (or business)
   (5) For his/her own or other family members' wedding
   (5) For the unpredicted expenditure (illness, death, natural disaster, others)
   (6) Saving for his/her old age
   (7) For buying stock, bond
   (8) For children's current and future education
   (9) Paying debt
   (10) Others
12. Where is his/her accommodation when s/he works as non-agricultural worker?
   (1) Home
   (2) Accommodation provided by working unit
   (3) Live in relative or friends' home
   (4) Rented accommodation
   (5) Others
13. Whether does his/her current job have the following welfare/
   (1) Working insurance
   (2) Pension
   (3) Medical insurance
   (4) Other welfare
14. Whether does his/her working unit give the following?
   (1) Holiday for women producing child, how many days?
   (2) Holidays for illness, how many days?
   (3) Holiday for training, how many days?
   (4) Other holiday of pay, how many days?
15. What's form of wage distribution?
   (1) By hour

(2) By piece rate
(3) Fixed wage
(4) Fixed wage plus bonus
(5) Group piece rate
(5) Others

16. Is s/he distributed municipal price subsidy?

17. How did s/he get the current job?
(1) Through personal relation
(2) Through official channel
(3) By own luck
(4) Others

18. To get the current job, whether has s/he paid deposit (or the payment of this kind)?

19. If s/he did pay the deposit, how much did s/he pay for the current job?

20. How much was the other initial cost?

21. How long have you been in non-agricultural work?

22. When did you get the current rural enterprise job?

23 How long have you been in migration work? How long have you been employed by the current unit?

PART 4

THE BASICS OF THE VILLAGE INVESTIGATED

1. No. of household, population and labour

No. of household	Population	No. of labour

2. Location

Distance to township location	Distance to local town	Distance to the belonged county city or city	Distance to the nearest prefecture city

3. Communication

(1) A railway station inside 2 kilometres.
(2) A bus stop inside 2 kilometres.
(3) No bus but have road inside 2 kilometres.
(4) Road or railway station in 3 - 5 kilometres.
(5) No road or railway station in 5 kilometres.

4. Main agricultural resources

Cultivable land	(Chinese Mu)	Grass land	(Chinese Mu)
Irrigated land		Uncultivated land	
Non-irrigated land		Uncultivated sloping land	
Plain land		Silted land	
Sloping land		Other uncultivated land	
Forest land		Water area	
Fruit garden		Fish pond	
Timber forest		Other cultivated water area	
Other forest			

5. Economic relationship

(1) All the cultivable land is contracted according to head of person.
(2) Subsistence land are contracted according to head of person, responsibility land are contracted according to head of labour.
(3) Other version of household contract.
(4) Contracted by the collectives.
(5) Other economic form.

6. Main agricultural crops

Grain crops	Cash crops

7. Main non-farm production projects

8. Rural enterprises

Industry	No. of enterprises				No. of person engaged			
	Village-ownership	Co-operative	Individual	Total	Village-ownership	Co-operative	Individual	Total
Agriculture								
Extracting								
Construction materials								
Manufacturing								
Communication and transportation								
Commerce and catering								
Services								
Others								

9. Labour flowing

How many labour had ever worked outside home township in 1997?	
Outside home township but inside home county	
Outside home county but inside home province	
Outside home province	
How many labour from outside township had ever worked in this village?	
Outside home township but inside home county	
Outside home county but inside home province	
Outside home province	

10. Net income per capita in late ten years from 1988 onwards.

11. Which months are the busy seasons or idle seasons?

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